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The Chemist Adds the Invisible Appeal in Finishing Fabrics

Creative Science Now Makes It Possible for Fabrics Not Merely to Pass the Olfactory Test But to Have the Added Appeal of a Distinctive Fragrance

By DONALD A. LAIRD, Ph.D., Sci.D.

Director, Colgate University Psychological Laboratory; Chief of Staff, Personnel Analysis Bureau, Chicago, Ill.

THE textile industry has known longer than any other industry the sales value of finishing products so that they appeal to the eye of the customer and to the customer's sense of touch as well as having merely wearing qualities. This beauty of touch and appearance is psychologically as valuable to the customer as is the protection from the elements afforded by a body covering or a window shade. A twofold service is thus rendered by finishing processes: Sales are stimulated, which benefits the manufacturer (or converter), and the aesthetic enjoyment of the customer is increased.

Finishing processes to date, however, have been able to achieve only a limited aesthetic appeal to human senses. The sense of sight is reached through the "looks" of the goods, its sheen, luster, surface; all appeal to vision. The sense of touch is also appealed to in the "hand" developed in the goods. If too stiff a texture it is run through a button breaker or tallow is introduced into the starch; if the texture is too flimsy to the senses of touch it is back filled. Only two out of the more than sixteen human senses have been cultivated in finishing processes. Figuratively this may indicate that only one-eighth of the avenues to the customer has been secured through the finishing processes. If the finishing processes could be developed so that one other sensory approach was captivated it would be increasing the sensory values added to goods in finishing by 50 per cent.

Creative science is now in a position to add to the finishing processes a third sensory appeal! It is already being added very successfully in some plants. It has been used in European finishing processes before—partly because Nature was beneficient in overcasting the finishing with peat smoke, partly because the smart French woman demanded fabrics that would yield this added sensory delight. This is the added appeal to the olfactory sense—fragrance, freshness, elusive aroma, interest compelling scents.

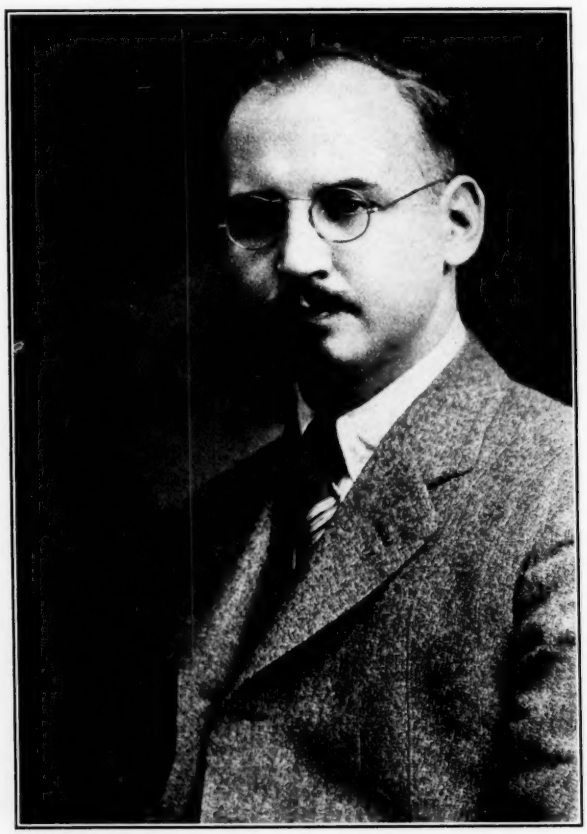
The finisher has always been careful to wash goods thoroughly so that there remains no putrid suggestion of the tallows, or pine oil, or acetic acid, or sulphonated castor oil, which had to be used in the weaving and finishing processes. Sad experience has taught that unless great care and expensive ingredients are used, goods lying for a time on the shelves are occasionally inclined to develop the pungency of rancid fats, vinegar's stench, or even the rottenness of sulphur compounds.

In the justified zeal of removing undesirable odors from the products, sight has apparently been lost of the dynamic value instilled into the fabric if it is given a suggestion of carefully chosen and delicate fragrance.

A wide and growing commercial experience in diversified lines is clearly revealing that the increased demand for goods manufactured to please the olfactory sense is appreciated by the consumer. A large manufacturer—one of the largest, in fact, of soaps—has advertised nationally within the past three years that his best-known soap was not perfumed. As a bringer of sales this advertisement was practically nil. Another soap was developed and around this product a new national campaign was started, which emphasized the fact that it was a cake of delightfully scented soap; its sale was phenomenal. It will take a few more months for the ill-effects of the other advertising which emphasized no scent to wear off, and the sales on their old standby to reach the point it would have without the handicap of this limiting appeal, which promised a limited pleasure to the user of a long famous soap. Apparently consumers want to smell clean as well as look clean.

Before pointing out how this new phase of applied chemistry can be put to potent use in the textile industry, a few illustrations from other manufacturing fields will be illuminating. There are fly and mosquito sprays, which contain up to 6 per cent of aromatics to give the air in a room a delightful fragrance, as well as to cover the obnoxious oily odor of the spray itself. Another manufacturer of gayly colored household paints adds a small amount of chemical aromas to his paints for the sole purpose of making the housewife's use of them pleasurable. Cigarette manufacturers have for years used coumarin in their blends. Coumarin is produced synthetically on a large scale, and is extensively used as a flavoring. It is found in nature in a number of plants. One cigarette manufacturer with a secret process uses maple sugar directly, consuming in the neighborhood of a million pounds annually. No cigarette has achieved a wide sale without the aid of coumarin or some other added creation for increasing their aromatic appeal. Leather glove manufacturers are adding a subtle touch of fragrance to supplement the not exactly pleasant odor of the processing, and some manufacturers of artificial leather are using synthetically created aromas to give their product the scent of real leather.

In the textile field itself one firm has specialized on a sheet that is lavender both in color and fragrance, while others are using these chemical creations to give to tweed the scent of English heather tweed.



Dr. Donald A. Laird, Director of the Colgate Psychological Laboratory

These accomplishments are due entirely to the researches of the creative chemist. Prior to the chemist's entry into this field possibilities were limited to the flowers produced by nature. And nature was not especially consistent, or generous, either. Too much rain in Bulgarian fields or a late spring around Grasse, France, and this year's flower oils would not have the fragrances of last year's. And nature was so stingy that a pound of 10% essential oil cost $400. To-day the creative chemist can give a pure 100% oil for $4 a pound, and it is chemically and aromatically the same this year as last. He has now outdone nature's generosity in other ways and can create practically any scent or fragrance one could imagine.

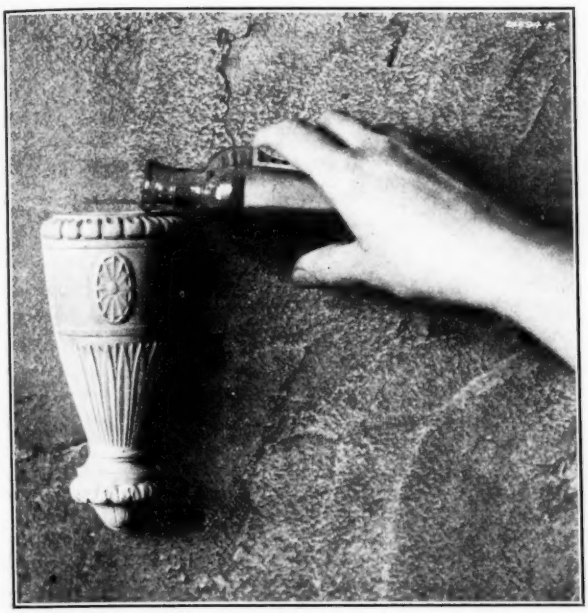
Semi-Permanent Fragrance

The usual fleeting qualities characterized by the quick disappearance of old-fashioned perfumes, for instance, has been overcome by the creative chemist. A short time ago I sensed a delightful suggestion of flowers in a research laboratory. The allure came from a piece of ordinary writing paper which had been tacked to a wall for three years. Three years ago the paper had been touched with a tiny drop of a synthetic aroma and had retained the slowly volatile scent clearly for three years, and 'seemed to be good for several more years' open exposure. A drop similarly applied to a piece of goods would yield its allure to the entire piece; it would be semi-permanent under most conditions and to add to the miracle, when unrolled every inch of the fabric would carry the scent and one could not discover where the piece had been touched originally by the creation.

The sales potency of this olfactory appeal is founded deep in human nature, even in human anatomy. Before birth the nervous system is being formed to give the sense of smell a unique and distinctive place among the sixteen odd human senses. The nerve connections for this sense are formed before any others. In the strictest anatomical terms there is not a sense organ for smell, but a brain tract. The eye or the touch sense organs in the fingers are appendages to the brain, but the olfactory endings are literally a tract of the brain.

It is also classified among the intimate senses due to its profound influence on human emotions. This is reflected in the use of incense in sacred rites.

Scents can build up an atmosphere of luxury or cheapness. Left uncontrolled they are too likely to build up an atmosphere suggesting cheapness. The manufacturer of one of the most expensive American-made cars goes to considerable care to see that the air in each display room is artificially scented—not perfumed—but scented to convey the intimate suggestion of luxury in a way more profound than could be reached through the eye alone. It would pay every manufacturer to give his own



Some Display Rooms Are Making Use of Porous Disseminators Which Are Periodically Filled With Aromatic to Help Them Sell by Smell.

products an olfactory test to see whether they carry a suggestion of cheapness or worth, to the intimate sense of the customer.

It is not enough that the finished product merely not offend this intimate sense. It should convey something positive to act as "messengers to the unconscious," almost to act as an aromatic trade-mark. This is adding the voice of a subtle allure to the fabric, which may be wee and small, but which lends powerful enhancement to the product. The swish of wispy chiffon, the abandon of transparent velvet, or the swirl of silks can all be intensified by the wise selection of the proper fragrance. It can add a final triumphant flair to the finishing of the goods.

This basic idea is widely approved in fashion-creating circles, Mrs. Rita de Costa Lydig, the Duchess de Guise, and Mme. Simeone giving it their heartiest approval, according to Paris despatches. Certainly it is not a new idea in its essence, strong fragrances in the form of perfumes being used by sixty-one out of every hundred women, according to Prof. Ivor Griffith of the Philadelphia College of Pharmacy. Practically every cosmetic and toilet preparation is carefully scented, but to a greater degree than has been found necessary by those textile manufacturers who have experimented with it. These have been scented not because the odor of talc was displeasing and had to be covered up, but rather because the scent enhanced the customer's appreciation of the product. Knowing now the position of scents as stimulating an intimate sense, it is easy to understand why women spent $177,000,000 for these preparations in 1927.

The textile manufacturer is playing with olfactory trouble continually in his finishing process. The oils and fats essential for spinning and weaving can readily yield a negative aromatic quality. Even the starches or acetic acid used in the bluing can add the suggestion of the odor of freshly hung wall paper or vinegar, respectively. Most dyes, also, have a distinctive but not alluring odor; this is especially true of blacks and khakis and those in the naphthol series. I have seen people, blindfolded, distinguish dyed from white goods solely by smell.

It is obvious that safeguards must be taken to prevent these going bad and depreciating the quality or appeal of the fabric. It is just as obvious that something with a positive appeal should be added whenever possible, and creative chemistry has reached the point where the American leader in this branch, Dr. Eric C. Kunz, conservatively says, "There is no odor but which can be neutralized, and very few products but which can have a rather lasting positive scent added."

Because of the tremendous selling appeal which pleasant scents give to merchandise, the progressive manufacturer will find it well worth while to examine his finished products from an olfactory standpoint, for he can actually Sell by Smell.

Dr. Eric C. Kunz, of Montclair, N. J., Who Has Developed Methods for Making Aromas to Suit Any Taste

FUNDAMENTAL WORK DISCUSSED BY TEXTILE RESEARCH COUNCIL

Discussion and Technical Papers Make Up Program of Spring Meeting

"THE textile industries of the United States have before them a great opportunity and privilege in the establishment and continuous maintenance of the foremost textile library and laboratories for co-operative textile research in the world," declared Dr. W. F. Edwards at the luncheon of the Textile Research Council held in the Submarine Grill of the Hotel Traymore, Atlantic City, on May 24.

Attended by twenty-two of the most active advocates of scientific textile research in the country, the spring meeting of the Textile Research Council was devoted to a general discussion of the problems confronting the textile industry in its effort to set up some adequate machinery for pursuing fundamental research and to the reading of two papers which supplied the concrete evidence of what such research may achieve.

Dr. Edwards, first vice-president of the Council, presided at the meeting in the absence of George L. Gilmore, the president, and delivered a paper on "The 'Why' and 'Whither' of Scientific Research." The two technical papers were read by Charles F. Goldthwait, a fellow of the Mellon Institute of Industrial Research, and William D. Appel, chief of the Textile Division of the Bureau of Standards.

The Council had as its guests at this meeting Dr. E. H. Killheffer, president; P. J. Wood, vice-president, and Dr. Louis A. Olney, chairman of the Research Committee of the American Association of Textile Chemists and Colorists, and A. W. Palmer, in charge of the Cotton Marketing Division of the Department of Agriculture.

Research Laboratory Discussed

One of the most interesting features of the meeting was a discussion of the various proposals to establish and finance the operation of a central laboratory for scientific research on textiles. "We have the men, the money and the organizing ability to make a distinctive American institution," Dr. Edwards said. "The only thing lacking is an evangelist, or a corps of them, to start action." The discussion which followed brought out the general opinion that the Textile Research Council is the type of organization best fitted to engage in the work of stimulating action on research and securing the financial co-operation of the industry through contact with textile associations, and finally of drafting a suitable research plan.

Dr. Killheffer and Dr. Olney, of the A. A. T. C. C., reviewed for those present the various investigations and studies of dye fastness undertaken by their Research Committee during the past few years, and explained the plan which they had evolved for financing a research laboratory by raising an endowment fund of one million dollars, to be contributed by the textile industry as a whole. Opinion was somewhat divided on the question whether a more modest sum would be adequate to provide for the initial work of such a laboratory as that proposed.

In order to depict to the textile men who attended the meeting the methods by which fundamental research may create an industry or improve an established product, Dr. Edwards traced step by step the numerous physical and chemical studies carried on by patient scientists over centuries that had finally contributed to the development of rayon. Chiefly he made the point that some of the most valuable work had been accomplished with no conception whatever by those engaged in it that ultimately it would make possible the invention of a new textile, and that rayon was, consequently, one result of many interrelated researches on fundamentals.

Charles F. Goldthwait prefaced the reading of his paper with the explanation that his purpose was to emphasize a field of research that is fundamental to an understanding of cotton yarns. He took as his subject "The Influence of Moisture on the Strength and Elastic Properties of Cotton Yarn." He described tests which, while elementary in nature, are believed not to be on record elsewhere. The chief points which Mr. Goldthwait made in his paper were:

"A 40s-2 combed peeler yarn of mercerizing twist gained 4.7% in strength for each 1% of added regain between 2¾ and 10%.

"A regulation warp-mercerized yarn of the same type did not change in strength through a regain range of 3¼ to 12½%, which covers all ordinary conditions. Since mercerized yarn is stronger under normal conditions, it should have an added advantage in dry atmospheres.

"The ordinary rules for correcting yarn strength to normal condition will not apply to this type of yarn.

"Data for stress-strain curves were obtained and plotted in such a way as to show the extensions at different regains at low, medium and high loads, as well as after unloading..

"At a large number of tensions and regains comparatively dry yarns show more extension than those of moderate regain, but not up to those of high regains, with some exceptions. This comparatively high extension for dry yarn is evidently due partly to the skein shrinking to a shorter length in a dry atmosphere and its recovery on stretching. However, it seems to be a real property of the yarn and might well be investigated further.

"The properties of a yarn that make it knit well or badly are not well understood. The writer wishes to suggest that the low-tension portions of stress-strain

(*Concluded on page* 400)

LOWELL TEXTILE HOLDS ITS ANNUAL COMMENCEMENT

Twenty-two Degrees and Six Diplomas Awarded—Many Win Prizes and Scholarships

THE thirty-first annual Commencement Exercises of Lowell Textile Institute, Lowell, Mass., were held in Southwick Hall of the school on June 4 and was attended by a large audience of friends and relatives of the graduates. President Charles H. Eames conferred degrees on twenty-two students and awarded diplomas to six others. The address of welcome by President Eames opened the exercises and was followed by a commencement address delivered by Hollis Godfrey, of Boston, president of the Engineering Economics Foundation.

President Eames then announced the medals and awards to be presented to the graduates. They were as follows:

Medal of the National Association of Cotton Manufacturers—Presented by Lincoln Baylies, president of the association, to Benjamin Joseph Zalkind, Dorchester, Mass.

Textile Colorist Award—A prize of $100 offered by the Textile Colorist, Inc., to a member of the graduating class whose thesis, based upon his personal researches and experience is of greatest practical value of the dyeing, bleaching or textile finishing industries.

Owing to the difficulty experienced by the judges in deciding upon the relative merit of two theses, it was recommended that the prize of $100 be equally divided between Bertil August Ryberg (Centerville, Mass.) for his thesis upon the "Study of the Synthesis of the Naphthol AS Series Through the Acid Chlorides," and Clayton Collington Westbrooke (North Andover, Mass.) for his thesis upon "Investigation of Tippy Dyeing on Raw Wool With Top Chrome Colors."

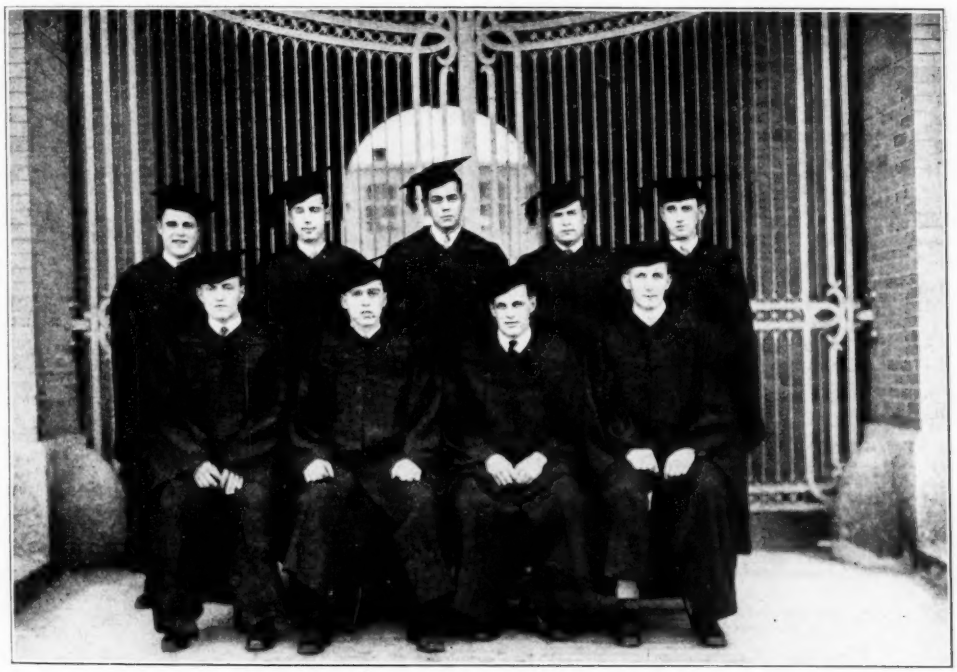
A $15 prize awarded by an alumnus who prefers not to have his name disclosed is awarded to Earl Raymond McLean (Haverhill, Mass.) for high standing in Report Writing.

Scholarship of the Proprietors of the Locks and Canals on the Merrimack River offered at M. I. T., awarded to Bertil August Ryberg.

Louis A. Olney Book Prizes (in the form of books): $20 to the regular student in the chemistry and textile coloring course who shall present the best thesis preparatory to graduation. Awarded to Walter Coburn Lindsley, Lowell, for his thesis, "Effect of Tension on Mercerization of Cotton Yarn."

Ten dollars and $5, respectively, to the students taking the regular chemistry and textile coloring course who shall be considered as having attained the highest and second highest scholarship in second and first year chemistry:

Second Year—First prize, Eric Arthur Peterson, Lowell; second prize, Norman Albin Johnson, Deep



GRADUATES OF CHEMISTRY AND DYEING DEPARTMENT, LOWELL TEXTILE INSTITUTE
Left to Right—Front Row: Raymond E. Weich, A. Kempton Haynes, Ira S. Hurd, Walter C. Lindsly. Back Row: Chas. J. Fredrickson, Bernard M. Phelan, Alvin W. Bergeron, Patrick J. Hetherman, Clayton C. Westbrooke.

River, Conn.; honorable mention, Gerald Anthony Ivers, East Chelmsford.

First Year—First prize, Joseph James Pizzute, Jr., Pittsfield; second prize, Leo Gleklen, Lynn; honorable mention, Herbert Eugene Meinelt, Lawrence.

The Textile Color Card Association Scholarship—Awarded to Margaret Gray Scadding, Lowell. Presented by P. J. Wood, vice-president and general manager of the Oriental Silk Printing Company and a member of the board of directors of the association.

Herbert A. Currier Scholarship—$100 given by Herbert A. Currier of the class of 1906 to a student selected by the faculty of the institute, the following conditions to be considered in making the selection: Scholastic standing, financial need and ability in promoting student activities in school life. Awarded to Edward Joseph Allard, Lowell.

The graduates were as follows for Department of Chemistry and Textile Coloring: Alvin Wilfred Bergeron, Charles Joseph Frederickson, Jr., Amos Kempton Haynes, Patrick Joseph Hetherman, Ralph Wentworth Holbrook, Ira Swain Hurd, Walter Coburn Lindsly, Bernard Michael Phelan, Bertil August Ryberg, John Prince Stanley, Jr., Clayton Collington Westbrooke, Raymond Edward Wiech.

COTTON PROBLEMS AIRED AT JOINT MEETING OF N. A. C. M. AND A. C. M. A.

Convention Marked by Strong Spirit of Optimism and Good-will

All the conditions and problems that wrinkle the brows of American cotton manufacturers were freely discussed in the two-day convention staged at Atlantic City, May 24 and 25, when the members and officers of the National Association of Cotton Manufacturers gathered with those of the American Cotton Manufacturers' Association. The occasion was the semi-annual meeting of the former body and the regular annual meeting of the latter, and it was therefore made more noteworthy by the joint meeting of both associations. The program, under these circumstances, could not have been other than interesting and furnished those who attended with sufficient food for thought for many months to come.

Arthur M. Dixon, of Gastonia, N. C., was elected president of the America Cotton Manufacturers' Association on the retirement of H. R. Fitzgerald. The National Association does not hold its election until its annual meeting six months from now.

The subject which created the liveliest discussion during this convention was the work and future plans of the Cotton-Textile Institute. Walker D. Hines, president of this Institute, spoke to the convention, of course, and centered his comments around the price-cutting evil. Lincoln Baylies, president of the National Association, addressed his group on Friday morning, May 24, and was followed by Mrs. Katrine Hooper, whose address was titled "Cotton, Esperanto of the Style World." At the meeting of the American Association the president of the National Manufacturers' Association, John E. Edgerton, discussed some of the "Problems of Progress." "Cotton Marketing" was the subject of an address by Arthur W. Palmer.

Outstanding in its clear-headed analysis of the present situation in the industry was the address of H. R. Fitzgerald at the joint meeting of the two associations on "Some of To-day's and To-morrow's Problems." Lincoln Baylies presided at the banquet held Friday evening, and the speakers included Walker D. Hines, S. R. Glassford and William R. Bassett and Mr. Baylies.

THIRD LIGHT-FASTNESS REPORT READY FOR PUBLICATION

A. A. T. C. C. Sub-committee and Bureau of Standards Complete Exposure Tests

The light exposure tests on 1,252 dyed samples undertaken by the Sub-committee on Light Fastness of the American Association of Textile Chemists and Colorists, in co-operation with the Government Bureau of Standards, have produced results that justify a lengthy report. Under the title of "The Fading of Dyed Textiles to Daylight and in the Carbon Arc" this report has been prepared by William D. Appel, of the Bureau, and William H. Cady, of the association, and will be published in full in the Proceedings, publication being planned for the June 24 issue of the REPORTER.

Twelve hundred fifty-two specially prepared dyeings on cotton, wool, silk and weighted silk, representing some three hundred eighty-one different coloring matters, were exposed to daylight in several different ways and to the light from a glass-enclosed carbon arc. Each sample was exposed for four different periods of time. In general, slight fading occurred in the first period, decided fading in the fourth, and intermediate amounts of fading in the other two. Seven sets of samples, all cut from the original dyeings, were exposed in the following ways: Sets A and K in the standard sun test of the American Association of Textile Chemists and Colorists—i. e., on clear days between 9 a. m. and 3 p. m. under glass, at an angle of 45° from the horizontal, facing south; Set B, simultaneously with Sets A and K but with no glass cover; Set D, continuously, under glass, in a vertical position, facing south; Set E, continuously, under glass, at an angle of 45° from the horizontal, facing south; Set F, continuously, under glass, in a vertical position, facing north; Set G-H, in the "Fade-Ometer," a type of glass-enclosed carbon arc. The results of a sample-by-sample comparison of the dyeings in the several sets with the corresponding dyeings in Set A taken as the standard are given in the paper.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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APRIL MEETING OF THE NORTHERN NEW ENGLAND SECTION

(*Continued*)

[NOTE—*The first part of the report of the Northern New England Section's meeting of April 6 appeared in the Proceedings of May 27, and included the paper presented by Dr. Carl Z. Draves, of E. I. du Pont de Nemours & Co., entitled "The Dyeing of Ponsol Blue BCS" and the discussion that followed. Below is the full report of the discussion on "Piece Dye Kettles," opened by Harold W. Leitch after the presentation of Dr. Draves' paper.*]

NOW, gentlemen, there is going to be a change in our program. Heretofore you have been the audience. Now you are going to be the speakers. The first speaker I will call upon by name, and I expect the rest of you to volunteer as the evening advances. The first speaker will be our good friend Harold W. Leitch, who opens the discussion on "Piece Dyeing Kettles." Mr. Leitch will cover this blackboard with diagrams of piece kettles for the benefit of those of you who do not know what they look like. (Applause.)

A Discussion on Piece Dye Kettles

OPENED BY HAROLD W. LEITCH

I want to tell you, first, that I did not volunteer to do this job, but it appeared that someone had to do it, and so I was selected to take the initiative. I think probably the best way to get at the discussion of this subject is to do as Mr. Cady suggested: make a diagram to start with, and perhaps revise it and add to it as the members wish.

First, I will make a simple diagram of an ordinary kettle of the present day. I will designate the front of the kettle with "D" as the depth and "W" I will call the width. Then, over here, this is the length (L), and the dotted line indicates the position for the baffle. (See Fig. 1.)

These kettles are built with a curve on the back, but some are straight, and there are a number of other features that can be applied.

We will have to consider first, perhaps, the overflow, and I am going to point out just a few arrangements of kettles and will leave it to you to decide what is best, and add to it also. Some kettles have an overflow at the front, cutting off the top part of the

front a few inches and boarding up with a false front outside the kettle. That allows the liquor to overflow into this box and down into the sewer; it can be piped from the false front to the sewer or dropped directly into the sewer. (See Fig. 1.)

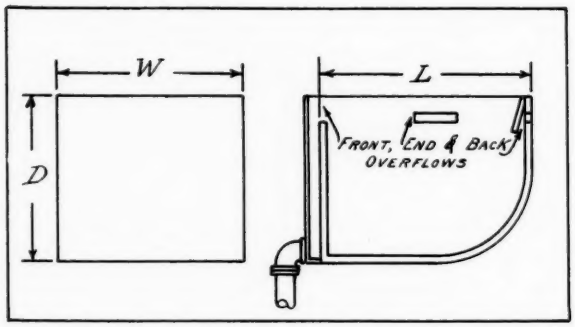

FIG. 1

Other kettles have overflows at the side of the kettle that may be plugged, or slots in the middle section, directly under the reel shaft, with a box at the side; and other kettles are made with overflows on the back, cut in approximately here (see Fig. 1), with a board placed over it to keep the cloth from going into it.

Now I will give you my opinion as to which overflow I would prefer in the ideal kettle; it is this last one which I just mentioned here.

We will take up the water supply next. It is considered more for rinsing off than for filling up the kettle. Some kettles are piped at the front with outlets clear across. That would be placed in the front near the top, in about this position [sketching]. Then, another system has a similar pipe on the back, practically at the top of the kettle, with the water coming down into the vat. And the most common arrangement is simply to have a water pipe coming in at the front or through the end of the kettle into the front—just a simple open pipe.

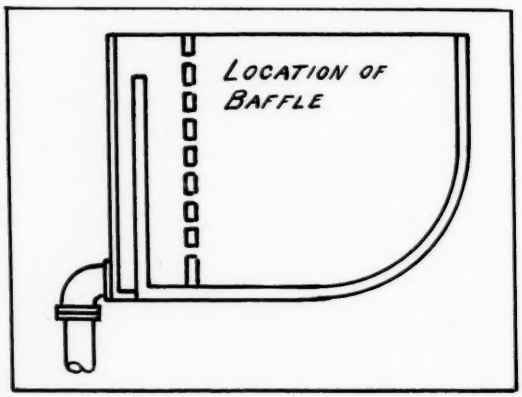

FIG. 2

ARRANGEMENT OF PIPING

There may be other arrangements that I do not know about or do not think of; but here again, in order to start an argument if I can, I will say that I think the simple pipe going into the front of the kettle is the best in practice.

Then, the feed pipe, or some device for feeding the dye into the kettle, is quite a common thing, and that is usually in front of the kettle, running along practically in the same position as the first water pipe described. It would run the whole width, a connection being made here for some sort of funnel through which the dyes may be fed. The solution may be put through a cloth, if desired, for taking out undissolved dye and foreign material.

There is one other feed pipe in common use, and

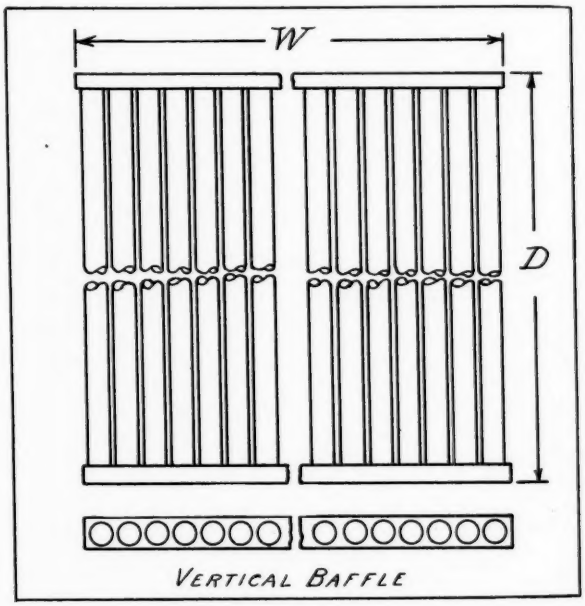

FIG. 3

that is one that is portable and can be used on various kettles. It is practically the same thing, but hung on the front of the kettle, and the perforations may be pointed either upward or downward. I think that for uniform feeding of a small quantity at a time, the feed pipe with perforations pointed upward is more satisfactory, as the whole pipe has to fill before any dye comes out at any part, and then it is more likely to come out evenly across the kettle.

The drain on the kettle is usually in the bottom, and often at one side. It is of metal, with metal seat and metal plug. Another type comes out in about the same way—I will show one on the other side of the blackboard here—into a standpipe which comes up to the height of the kettle and has a wooden plug or other device in there for controlling the drain at the bottom. That is an arrangement that is perhaps used more in stock dyeing machines than it is on piece dyeing kettles.

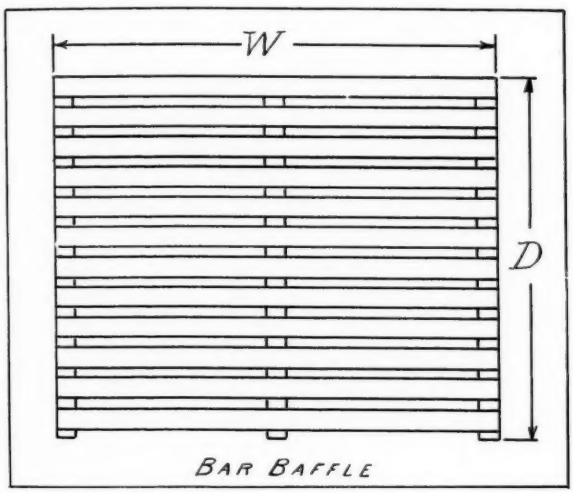

FIG. 4

Now, the baffle. The common type is a perforated board or plank. It is put into position, perhaps a foot or a little more from the front of the kettle and extending from the bottom to the top. (See Fig. 2.) Another type of baffle is made with upright slats or turned wooden pieces set parallel similar to that (see Fig. 3), and they are set very close together and usually in sockets at the bottom and at the top to keep them in position. They have to be quite heavy to keep them from warping, as the danger in that type of baffle is that the cloth is liable to get in between them if they are warped.

I will mention a third type of baffle; it is made of parallel pieces of wood, something on this order (see Fig. 4). These bars are fastened together in various ways. There may be a metal rod running down through them in perhaps three or four places, or they may be fastened with pegs or dowels and supported on pieces of wood. A common baffle of that type would have a space of half an inch between the pieces, and perhaps the bars themselves would be 2 to 4 inches thick. This baffle has proven satisfactory for a number of types of work, acid dyeing, chrome dyeing and union dyeing; and again, trying to get an argument started, I will say that this is the type I would select for my ideal kettle.

THE POSITION OF THE REEL

Now let us consider the reel. I will make another outline here. The position of the reel is a point for discussion; the type of reel is another point. I should say that the exact size of the reel would depend somewhat on the work, but is perhaps of minor importance where there is a whip roll. The type of reel is something that we probably will never agree on. There is the ordinary bar reel, the drum reel, the bar and hump reel, and the drum and hump reel.

I should say that in the ideal kettle the reel should be placed so that the cloth coming off the reel into the back of the kettle would drop approximately at a point halfway on the curve. That is, a plumb line dropped from the back of the reel would drop at a point halfway on the curve at the back of the kettle (see Fig. 5). I think perhaps the type of reel that is in most general use is the plain drum reel. With a whip roll on the kettle placed perhaps in a position about like that [indicating by sketching], just a little in back of the baffle and above the kettle, the cloth is taken straight up from the bottom of the kettle over the whip roll and over the reel (see Fig. 5). The whip roll is very useful in one way, and that is to take water from the cloth and keep it from splashing; and

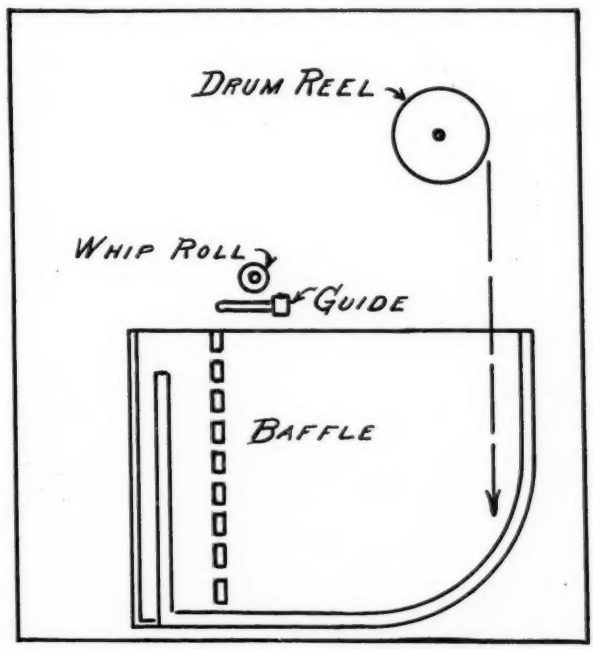

FIG. 5

in another way it makes a small reel practicable, where with the whip roll a very much larger reel would be the thing to use.

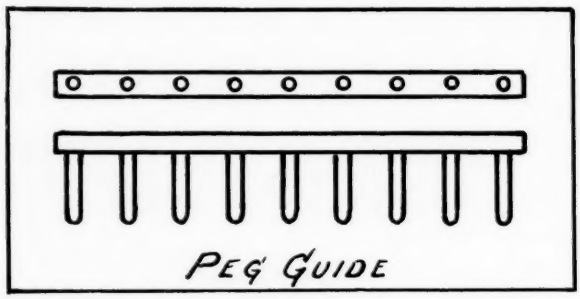

FIG. 6

The guide or separator for the cloth is another point that we do not often agree on in the different plants. There are a number of types of guide or separator. There is one called the peg guide, which is placed in various positions, perhaps down inside the kettle and perhaps well up above; it could be a beam of perhaps 4 by 4 inches or 6 by 6 inches, with pegs or pins projecting from it (see Fig. 6).

Then, there is the ladder type of guide, which is very common, and that will show practically the same elevation as before; and with movable pins it is adjustable for a larger or smaller number of strings (see Fig. 7). I think that both of these types have advantages. In the case of the peg guide, if there is a tie-up in the kettle it is perhaps easier to handle the work and get rid of the tie-up. With the ladder type it requires sometimes the pulling out of a pin, but as a rule the tie-up can be taken care of with either one. I am sure I am not ready to state which type I prefer. There is another point in connection with these guides, and that is an automatic stop motion or an alarm which may be attached to either one.

In the case of a tie-up, a slight tilting of the back of the peg type, or the whole frame of the ladder type, will throw an automatic stop motion and ring an alarm; which is, I think, a very useful feature.

THE FACTOR OF SPEED

Now, before getting away from the reel we have to consider speed. I have seen reels on piece dyeing kettles operate at different speeds even in the same dyehouse, with apparently good results from both speeds; but I think I would select a speed of 60 yards a minute for the average kind of work. In this connection I think it is very likely that the higher the speed of the reel the more chance there is of getting shaded goods, and the slower the speed of the reel the more chance of getting clouded work.

Another point that we always talk about when we are comparing notes is the relation of the volume of liquor to the weight of the cloth, or the weight of the liquor to the weight of the cloth. I would select for ideal conditions the ratio of 1 of cloth to 20 or 30 of water by weight.

Now, I think the most important thing that remains for me to speak about is the steam piping. That is a feature of the dye kettle which I think is of major importance, and I will put a few diagrams on the board here.

This one, No. 1 (see Fig. 8), will represent the steam pipe of the L type, the supply pipe coming down from the valve, down the side of the kettle and across the front.

Then the double-L type, No. 2, which is practically the same type of construction, with one pipe coming down each side and going clear across. That is sometimes modified by running it only halfway across and having two valves. It is also sometimes modified by supplying it from one valve up above.

Another type of kettle is fitted with steam pipe No. 3, coming down outside, through the bottom of the kettle, to a T.

Then there is steam pipe No. 4, where the supply comes down the side, across near the top of the front of the kettle, and then down the center to a T, giving a very similar effect as in No. 3. No. 5 is a loop pipe

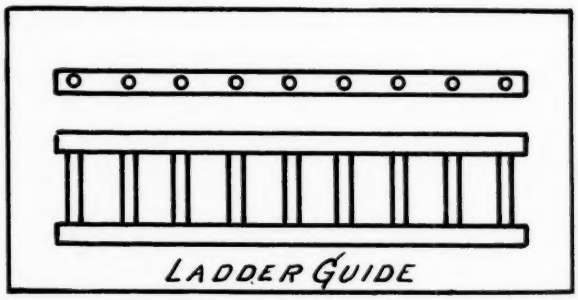

FIG. 7

which gives a feed of steam from both sides at the top of the kettle. This loop is entirely below the top of the kettle.

No. 6 is a similar loop type with the upper part of the loop going overhead, and the pipe down both sides, and the perforated pipe across the bottom, which gives also a feed of steam from both ends of the pipe.

I think that is all I need to put on there, although there are various combinations of these, and also others; and then there are double loops, where there

are two loops in a kettle. Whichever one of these types is used in the dyehouse, the number of perforations is very important. The size of the pipe, of course, is governed largely by the steam pressure available; and the lower the steam pressure, naturally the larger the pipe and the larger the perforations or the number of perforations.

In this particular one, the L type (No. 1), if there are too many perforations or if the perforations are too large, which means the same thing, the tendency is for the steam to shoot by the holes nearer the supply and to come out toward the end of the pipe, giving uneven results. And that same thing applies to No. 2; but with No. 2 you have two chances, and I think they are both chances—really, there is nothing very reliable about either type. The T type is likely to give more uniform temperature across the kettle, but it is still subject to the same fault if the number of perforations is not correct. That also applies to No. 4, which is also a T type.

Nos. 5 and 6 are practically identical, the one big advantage being that the pipe which comes from the T near the supply can be reduced in size there so that the rest of the pipe may be smaller, and that it will feed

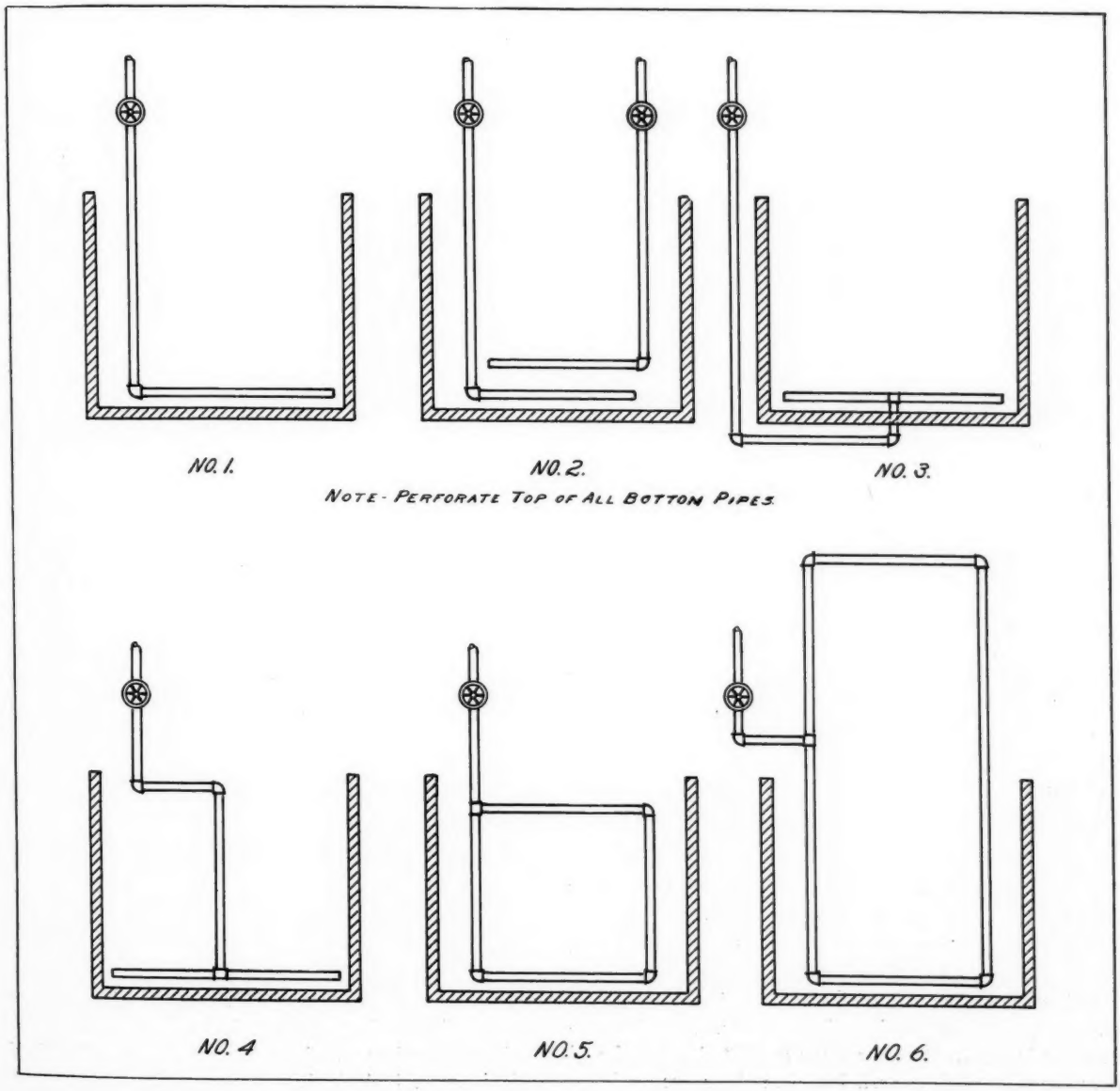

FIG. 8

from both ends of the perforated pipe and therefore most likely give more uniform heat conditions, even though the number of perforations is not just right.

I think I ought to speak about steam pressure in connection with the kettle. For hand control it is very likely that the high steam pressure is easier to work with, but for automatic time and temperature control it makes very little difference. For a simple temperature control for the maintenance of maximum temperature, the high pressure is better, unless each individual kettle is equipped with a steam pressure regulator.

The variation of a few points gauge pressure on a low steam pressure main is very much more important than usual or similar variations in the high pressure steam line, on account of the difference in the amount of heat that will go through a fixed orifice at the different pressures. In other words a 2-pound variation, in what should be a 10-pound pressure, is a great deal more in proportion than a 2-pound pressure variation on a 50-pound supply.

There is one other point in connection with piece dyeing kettles, and that is the kind of metal that should be used. For years brass has been the most common metal for the steam pipe, and I think it is far superior to some of the other alloys for that purpose, although I think there are great possibilities in the alloys of the present day. The shaft for the reel is very important, in the case of a bar reel, anyway, because the bar reels are very likely to go to pieces after the steel shaft has corroded considerably and allowed a loosening of the spider on the shaft. Also the drip from the steel shaft into the kettle changes some dyes a great deal. On drum reels, if they are tight, the shaft is perhaps of less importance, but still I think that an alloy shaft is quite practical.

In regard to the lining of kettles with metal, I can only say that the mills have had a lot of bad experience in trying to line dye kettles, for acid dyeing and chrome dyeing, with metal. Here again I believe there are possibilities in the latter alloys.

I think that is all I will say at this time, but we would like to hear from any of the men present in regard to any of these points or any other points that I have not mentioned. I know there are a lot of other points about the kettle. One of them that I have not really said anything about is the curve of the bank of the kettle.

J. H. Grady—What is the temperature at the back of the kettle taken at just about the water line?

Mr. Leitch—If you had it as high as you could get it, you would get the best result provided the steam is not shooting in toward the cloth. A lot of acid dyes will level at a temperature of 210° F., that is, when the temperature in the front of the kettle is 210° F. a lot of acid dyes would probably level, but then there are probably some that would not level when the temperature was 210° F. in the front of the kettle.

The Proper Temperature

Mr. Grady—What would you say was the proper temperature in the front of the kettle?

Mr. Leitch—About 208° F., I should say.

Mr. Grady—And in the back of the kettle?

Mr. Leitch—That depends a great deal on the construction of the kettle, what temperature you do get there, but with the perforated board baffle the temperature in the back of the kettle at this point, where I have indicated here, half-way down, would be at least 10° less than in the front of the kettle.

Mr. Grady—It is interesting to note that some new

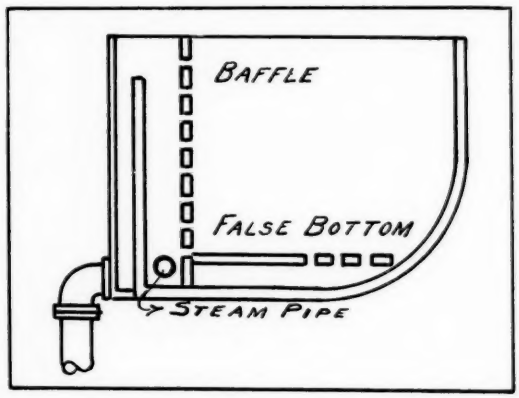

Fig. 9

kettles have not enough perforations in front. The back will be about 150° and then ranging up to 180° you can get reasonably good results. But if you get higher there is trouble.

Mr. Leitch—The great advantage of the bar baffle is that you get more uniform temperature conditions in the kettle than you do with a perforated board. It makes quite a difference in the uniformity of the temperature through the kettle.

Chairman Cady—Doesn't the bar baffle let the dye go through too fast?

Mr. Leitch—I don't think there is any difficulty with the dye traveling too fast. With union dyeing at low temperatures the perforated baffle is very poor because of the great lack of circulation. If you are running with steam shut off, there is no stirring action in the front of the kettle, or very little. There is one other method of getting better circulation in a kettle and that is the placing of a false bottom in here (see Fig. 9). It may be parallel to the regular bottom of the kettle like that [sketching]. This is a solid plank false bottom, with the exception

that right in the back there are slots, made by placing narrow strips there instead of wide planks. That gives a great deal better circulation in the kettle. That, in connection with the steam pipe placed in the kettle here, with the perforations facing up, will give a very good circulation. One bad feature about putting that into old kettles is that you reduce the capacity of the kettles that much, although I do not think it really amounts to a great deal.

Chairman Cady—Mr. Leitch, you have not said anything about hoods over kettles.

Mr. Leitch—The hood is so customary that I did not think to mention it. There is a great difference in hoods, however, and the construction of the shaft particularly. In order to get good ventilation and good movement of the vapor from the kettle, some of these hoods have steam jets, or heaters, while others operate very satisfactorily without any jet or heater. Now I think that some of these men here that know so much more about this subject than I do, ought to have at least one point that they could tell something about. Is Mr. Putnam here?

L. N. Putnam—It seems to me that an important consideration is the need that the kettle should be adapted for general utility purposes, and especially in view of the fact that we have so many different kinds of material to be handled in a kettle. As far as it is possible, the kettle should be made to suit all conditions, and I think it is possible.

I am not sure that I wholly agree with Mr. Leitch in his opinion as to the position in which goods should be dropped into the kettle. I believe that the goods should drop as far back as possible for this reason: The less piling up you have of those goods, the less tendency of the piece as it is folded, to bind up against the front, thus causing a lack of motion. The further back you have it, the more tendency there is for that piece of cloth to avail itself of the volume of the dye bath. In other words, it is free to move about in the kettle, and with a larger quantity of goods.

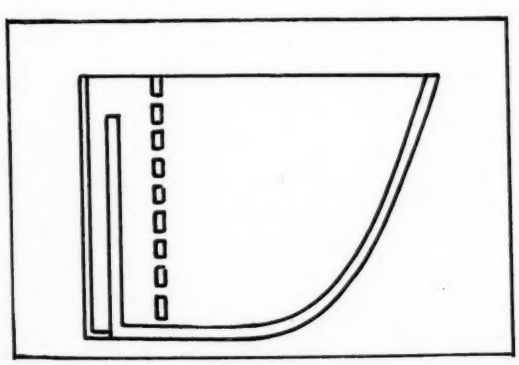

FIG. 10

AN UNEVEN DIAMETER REEL

There is another feature that I had considered quite important, and the more I consider it the more important I believe it is. In a great many types of stock an uneven diameter reel is a great thing. Even an oval-shaped reel or a triangular reel is helpful. The goods are then folded.

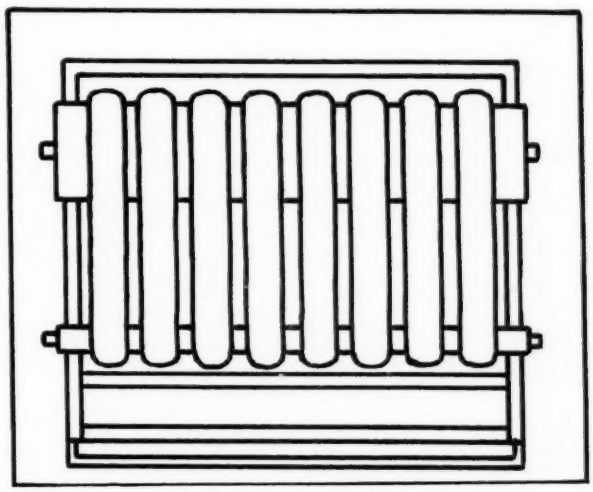

FIG. 11

If they are plaited down there in folds there is less tendency to bind against the front of the kettle; that is giving more opportunity to utilize the volume of liquor you are using.

Then, again, another question about the intake of water. If water is put in at the front, which is probably most ideal, as far as proper diffusion of the cold water with the hot dye liquor is concerned, there is this drawback: It is not economical and requires considerable time in washing off. Perhaps the overflow in the back of the kettle might be practical, but I think that if properly applied the washing from the back is as good as any way.

Admitting water from the top of the back is, I think, as good as any way for washing, and for general utility I do believe in the overflow. I do not think it makes any difference about the sort of reel other than to have the reel so placed that the cloth will drop in the proper position in the back. The further that piece of cloth is dropped from the front, the more tendency there is to stay in the back away from the false front. You may get the same temperature in both places, but the position of the cloth may be in the front or the back part of the kettle according to the position in which the cloth drops from the reel. Therefore the practical reel in my opinion is the reel which drops the cloth farther back. I bring up those points and I should like the opinions of others on them.

You have spoken of steam pipes. Everybody has his pet hobby on steam pipes. There is one question in connection with that which is very important, and on that question there depends all the difference in the world. You may have a narrow kettle or a wide kettle. The wider the kettle the harder is the control of the steam circulation. For a common kettle I prefer, as the most economical and advantageous, the plan suggested as No. 4 (see Fig. 8). For a wide kettle I believe that some modification of No. 6 or No. 2, where the two pipes overlap, is best. The double L type may be just as economical. The one trouble there is to run the two steam valves by hand and get uniform intake on both sides. With any steam piping with a dead end the steam has a tendency to throw toward the dead end. For instance, take No. 4: The circulation there would be toward the sides of the kettle, and if you have your kettle too wide you will get uneven temperature from that type of arrangement, but for a narrow kettle I believe it is practicable.

Now, I wish somebody would get up and knock my argument to pieces.

Mr. Leitch—In the case of the drop of the cloth, if the cloth is too far forward when it drops at the center point of the curve, then we have too much curve perhaps. It makes quite a difference whether this curve starts sloping from the very top of the kettle in this manner (see Fig. 10), or down vertically to the point where you start the arc, but there are other kettles which are really not built with a curve at all—either with a vertical back or on an angle.

In regard to the overflow, I think I agree with Mr.

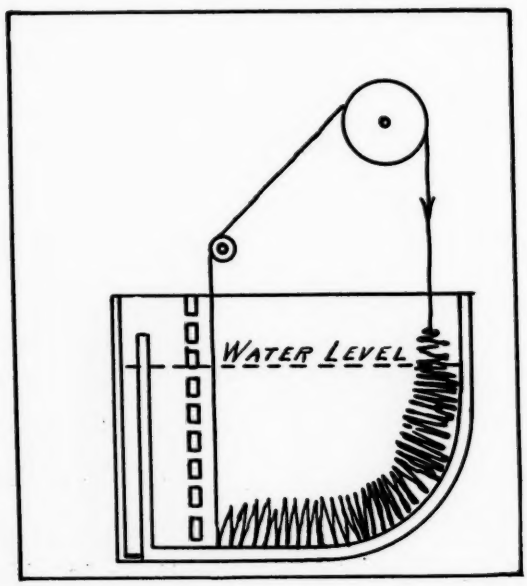

FIG. 12

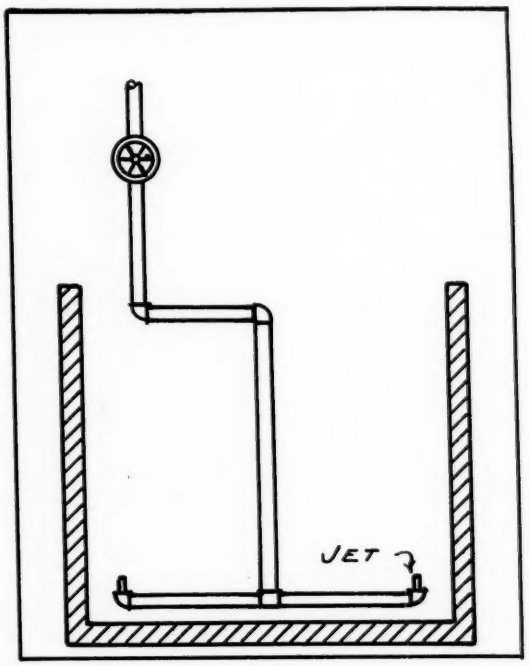

FIG. 13

Putnam in general; in putting the water pipe at the front I intended that the overflow should be at the back.

H. C. Chapin—It seems to me that in some kettles the way the goods issue from the liquid over the whip roll makes a difference in the amount of drip through the cloth.

Mr. Leitch—That is true, the higher it is the more the water is carried up. Of course, the kettle without any whip roll would show the largest amount of water carried over with it.

LENGTH OF KETTLE

Mr. Putnam—This is an interesting subject. I think that perhaps the idea of having the kettle long can be overdone, but I believe that kettles normally that are not too long from front to back are the best. I think the ordinary type of kettle is not too long. I think that there is one feature that is not brought out enough, and that is the depth of the kettle. I believe that the depth of the kettle has a lot to do with the floating of the goods. Goods which are not floated in the kettle do not get the proper dyeing conditions.

Mr. Leitch—What dimensions would you suggest for the all-round piece-dyeing kettle?

Mr. Putnam—The kettle should be nearly eight feet in length. A kettle of that width should be 5½ feet deep. If it is shorter than that in length, I should want to make

it 6 feet deep; but 5 or 5½ feet deep is right for an 8-foot-long kettle.

Mr. Leitch—Is there anything to be said on the width of the kettle from side to side?

Mr. Putnam—That all depends on the running. I prefer personally not to have extreme widths because I believe that an eight-string kettle is all that you can handle practically with even heat distribution.

Mr. Leitch—Now I think there ought to be some other opinions on this point. I would like to hear from somebody else.

W. C. Durfee—Can you draw a top view, showing the lay of that baffle, showing where the water will circulate around the cloth in the kettle?

Mr. Leitch—Do you mean a plan?

Mr. Durfee—Yes, showing the cloth, too.

Mr. Leitch—I guess you want an isometric drawing, and I don't think I am very good on that. But here is a plan [sketching] that I should say would do for a plan of that kettle. This is the reel, this is the whip roll, and here is the baffle. (See Fig. 11.)

Mr. Durfee—Could we have an underwater plan? I am interested in the position of the various pieces of cloth, showing the opportunity for the water to go around the cloth, as you look down on top of the kettle.

Mr. Leitch—This [new sketch] shows the plan; the cloth comes up over the whip roll, and over the reel. I do not think that the dyers will recognize their kettle because they do not look at it from this angle. (See Fig. 11.) This elevation here practically shows the way the cloth comes in and how it piles up in here in this manner [sketching], and the level of the liquor is approximately here. (See Fig. 12.)

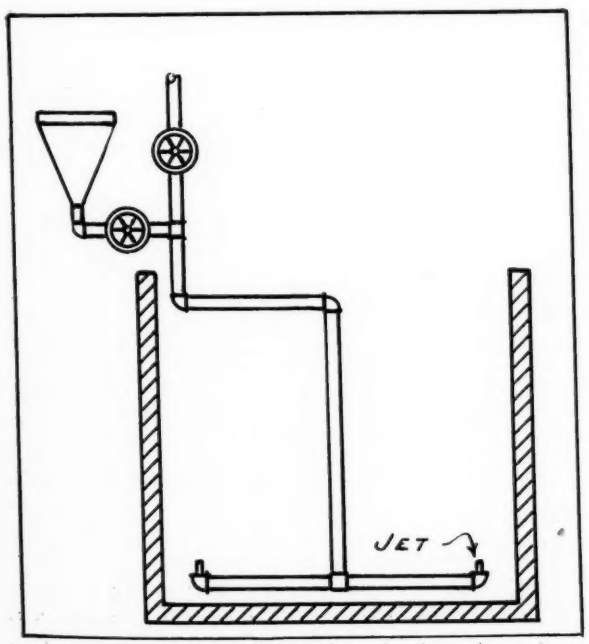

FIG. 14

IMPORTANCE OF CIRCULATION

Mr. Durfee—I gain from what has been said that the circulation in most dye kettles is extremely poor, particularly when it is moving around fast enough to get mixed with a satisfactory speed. I feel that the free space on the left and right side and the space between the pieces of cloth and the space behind the reel has a great deal to do with the travel of the cloth.

Mr. Leitch—I think there is practically no free space on the sides of the cloth in a fully loaded kettle.

Mr. Durfee—Then the circulation is practically choked.

Mr. Leitch—The circulation is practically over the pile, over the cloth and down through. Of course there is space between the cloth, but it is likely to be very small.

H. C. Chapin—Why don't you put a centrifugal pump on it? Would it be too complicated?

Mr. Leitch—I think the idea is good; to have a propeller or agitator or pump of some kind.

Dr. Draves—Would it be practicable to put the holes nearer together in the inlet in the center, and have them further apart, out near the end of the T, so as to secure a more even distribution of steam?

Mr. Leitch—I may say in answer to that, that it has been tried, but I think that when we have the right number of holes in the pipe, that the pipe will be filled with steam at practically the same pressure and all the holes will deliver practically the same amount of steam. The reason you need the holes closer together in a case like that would be that you have too many holes in the pipe and the holes would take away steam really faster than you care to supply it.

H. E. Gile—In the case of No. 2 diagram, why couldn't that be operated from one valve?

Mr. Leitch—I mentioned before that sometimes they are operated from one valve, and have to be in some cases; they should be for manual control.

Mr. Grady—On that question of reducing the speed of the cloth, and getting cloudy dyeing. How do you account for that?

Mr. Leitch—If the cloth stopped you would get cloudy dyeing.

Mr. Grady—Would it look like a cloud, or a streak?

Mr. Leitch—Very likely cloudy.

Mr. Grady—What about shaded sides and center?

Mr. Leitch—That might be accounted for by the liquor running back off the cloth, and it would have a tendency, perhaps, to run to the side of the cloth if it is

not tacked. If it is tacked it might not go to any one part more than another or it might go more to the center. That is the only way I can account for its being caused in the kettle.

Chairman Cady—Is tacking practised commonly?

Mr. Leitch—Tacking is used a great deal. Some fabrics cannot be dyed practically without tacking; at least not in most kettles. If anyone has a kettle that will dye real broadcloth or fine face finished fabrics without tacking, I should be glad to hear about that.

F. A. Keyser—Are all the steam pipes perforated, Mr. Leitch?

Mr. Leitch—No, there are kettles which are heated by indirect steam, but they are not very common.

Mr. Keyser—I have seen one like that on the blackboard with a two-inch pipe, and then reduced down to a quarter of an inch on each end.

Mr. Leitch—That is very interesting.

Mr. Keyser—And there are two little pieces here [indicating], and it is doubled there. As it comes up, it is reduced—from a 2-inch pipe to a ¼-inch, and it looks like this. (See Fig. 13.)

Mr. Leitch—I should say that was quite a scientific installation.

Crowding the Goods for Penetration

Mr. Keyser—It was one of the latest kettles that I have seen. I had a valve here, and all you had to do was to open that, and it goes down here and the steam comes up inside of here. Steam pipes are perforated, as a rule. You have been talking about the steam not getting sometimes to the end and that sometimes it would get there, so that the dyeing fades away from dark to light. But with this arrangement you cannot have that, because it comes out of this reduced outlet here. I have seen that in a mill where they have cloth at $8 a yard, and very good results. Also the feeding is through the steam pipe through a funnel attached outside the kettle. You open it up and let it go in, in its own way, and for two minutes you do not turn on the steam valve, but let it suck through (see Fig. 14). If you take plushes, heavy woolens, and heavy overcoating, you have got to get penetration. You can only get that by its own weight. That is why I favor crowding the goods. I favor having the water supply at the front. If you have the supply going in at the back you will chill the pieces too much.

Chairman Cady—Are there any further amendments?

Mr. Leitch—I have just thought of something else in connection with Mr. Putnam's suggestion about the type of reels. He suggests the bar reel and the oval reel and the triangular reel. Some kettles have a plaiting arrangement or swing, in back of the reel, which will do the same thing. There is one advantage in the bar reel and triangular reel, in that the bar is not very apt to slip. A drum reel usually has to be covered with cloth in order to get the proper friction, we might say, or to prevent slipping.

E. S. Chapin—There is a question I would like to ask about No. 1. Does the most steam come out first at the elbow and fade away, or on the end?

Mr. Leitch—If you do not have too many holes you will perhaps get slightly more near the elbow.

Mr. Grady—Can't you graduate the perforations from one-sixteenth down to one-eighth and one-fourth at the ends?

Mr. Leitch—I cannot say what is usual, but I have observed in my experience that there is usually equal spacing. But to get back to Mr. Chapin's question, if there are too many holes, without doubt you will get too much steam toward the end of the pipe and none near the elbow. That is a fact which has been well demonstrated many times.

W. H. Zillessen—In Fig. 1, do they graduate the holes in size, with the larger holes in the center and the smaller holes at the ends?

Mr. Leitch—I think that is another way of getting around figuring out the right number of holes. If your perforations are too small and too few you will get a back pressure.

E. S. Chapin—Does it make any difference in the pressure of steam where the most steam comes out?

Mr. Leitch—Yes, that is individual, for the kettle, just what number of holes you would have to suit that particular kettle and the particular steam pressure. I do not know of any way of figuring it out, but you can tell by experimenting on the kettle. I think it would go a great deal according to the volume of liquor that the kettle would hold. If you figure that for one 500-gallon kettle, that would probably include any other 500-gallon kettle.

Mr. Haskell—Mr. Leitch, you mentioned drag or slip on that reel. Does that usually happen?

Mr. Leitch—There is too much slip, usually.

Mr. Haskell—I have seen sometimes cotton goods which looked as if they had been handled by a washboard. Is that a case where it happens?

Preventing Friction in the Kettle

Mr. Leitch—It quite often does in dyeing cotton goods or woolens. We get what we call kettle rubs, the hump method having been originated to eliminate that slip; but if you get a tie-up in the kettle, which is really a knotting of two or more pieces of the cloth, the hump kettle holds it so tightly that the cloth is likely to be ruined. I know there are some men here

who know more than I do about piece dyeing kettles.

Mr. Lewis—Why could not they put some friction material on the reel—not in the nature of something which would cause a real rubbing on the cloth, but something which would retard the movement and which would not allow the slipping, and still it would be delivered so that the water would not work it off?

Mr. Leitch—I have not heard of such material as that. Perhaps somebody else can answer that question.

Mr. Lewis—You know there is a latex material which is put on carpets, rubberized, so that they will not slip, and a nice job is done on that.

Mr. Leitch—Men that work in dyehouses don't like to wear rubber heels because they are so slippery. Rubber might hold a carpet to a floor but not cloth to a reel. I am looking for information.

A Member—It will slip more; rubberized cloth slips more than untreated cloth.

Mr. Leitch—I rather think that is true. On bar reels a fairly sharp square edge on the bar will carry the cloth well, while the edge will last, but it does not last very long with ordinary wood. I will agree that there is a great chance for invention in regard to piece-dyeing kettles.

Chairman Cady—What is the maximum length of piece that can be run?

Mr. Leitch—I cannot answer that question, Mr. Cady.

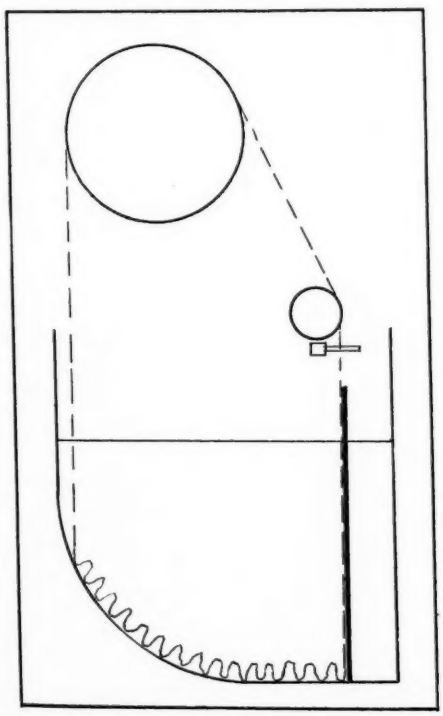

FIG. 15

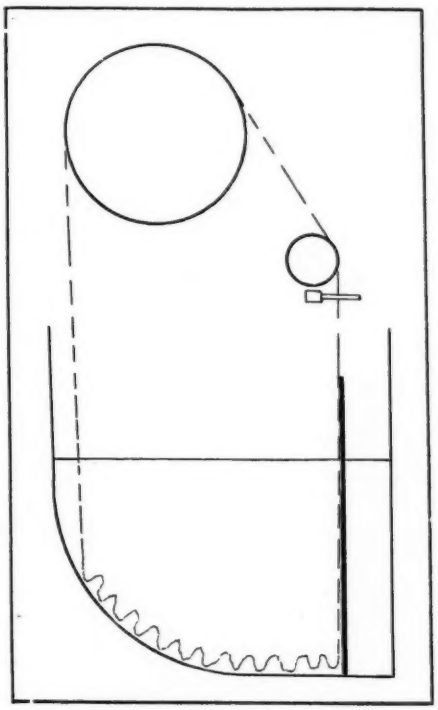

FIG. 16

Is there anyone here who can answer Mr. Cady's question as to the maximum length of piece that can be run in a kettle?

Mr. Putnam—I have run three hundred yards, made up of six pieces fifty yards each, but that was run open width. I do not think that in general it is advisable to run more than 100 yards in a rope. The kettle would have to run too fast. The weight of the water being pulled out of the liquid, I think, governs the speed more than anything else; there must be a barrel of water coming up all the time, making a considerable suction as it falls back.

Mr. Keyser—Eighty yards is the largest piece I have ever seen.

POSITION OF THE WHIP ROLL

Hugh Christison—There is one other point not mentioned. It is not original with me, but it will interest you, and that is the position of the whip roll. They tell me that the position of the roll has a big influence in whether the kettle will dye evenly or not. If the whip roll is placed fairly near the surface of the liquor, the cloth drags over the reel without changing its position. But as the whip roll is raised so that the distance between the whip roll and the liquor is increased, there is a tendency for the cloth to change its position. There

is one point which Mr. Leitch mentioned which was a surprise to me, and that was the putting of humps on the reel to overcome friction. I have always been told

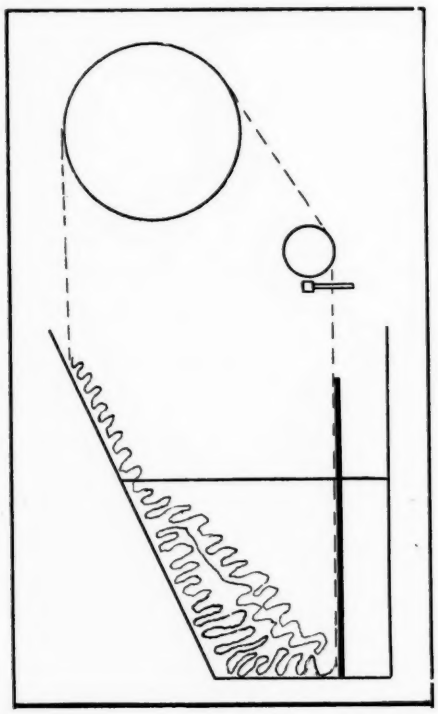

FIG. 17

that the use of humps was to break folds and prevent uneven dyeing, the humps being scattered so that they hit the cloth at odd spaces and break folds which would otherwise remain in it and cause lashing.

Mr. Leitch—I think I agree with Mr. Christison, and I will also say in regard to the whip roll that doing away with that part of the kettle entirely is perhaps still better than raising it. But in that case we need a larger reel in order to have the cloth come up fairly straight from the kettle.

Mr. Grady—Do you get more tie-ups without a whip roll?

Mr. Leitch—No, I don't think that has anything to do with it.

Mr. Grady—Have kettles ever been built with two reels?

Mr. Leitch—Yes.

W. A. Paisley—I think you would get more tie-ups without the whip roll. The reason that the whip roll is raised is to allow tangles to fall out. If your whip roll is too near the liquor you will hold the tangles in (see Fig. 15), but if you raise your whip roll the tangles will fall out. (See Fig. 16.) As far as the slipping on the drum is concerned, you will not get it if your drum is the right shape. I can readily show you what it would be like by a sketch on the board. You will find a great many kettles of that shape. (See Fig. 17.) The cloth will pile in back coming down from the rear, and then fall forward. The cloth pulled from under the pile will pull it up to the guide rack and will cause tie-ups if the roll, being too close to the water level, does not give it time to fall out. If you raise the roll there [indicating] (see Fig. 17), there is more chance for tangles to fall out when they are coming up to the roll.

On this type of kettle (see Fig. 18), one of the troubles is that the cloth will pile in there and do the same thing. If you would bring the shape of the kettle out one foot further and allow the cloth to straighten out (see Fig. 20), it will never get as far as the false front. It will pick up before it gets there, and you will have an easy movement all the way. By carrying your whip roll or idler up straight, it gives the cloth more of a chance from the water level to straighten out. You were also talking about overflows; that was a surprise to me, and I think so far as the overflow is concerned my idea about an overflow and plug is this: The plug has given the dyer a lot of trouble, getting out the strings from the sewing which get down under the plug, making it leak, and from time to time you lose a lot of liquor. Let us do away with the plug in that position, and put in a

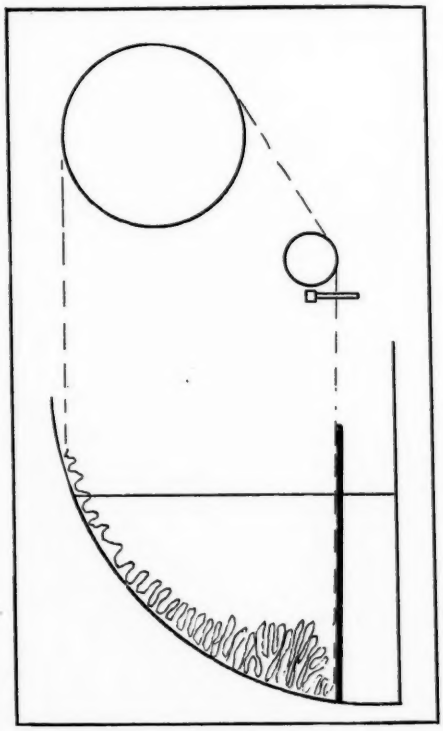

FIG. 18

swivel pipe at the outside of the kettle, which will answer the purpose of both plug and overflow. (See Fig. 21.)

Once you stuff your kettle, your swivel pipe is upright. You want to drain off your kettle, and all you have to do is bend your pipe down to any angle you want. You have no leaking at your outlet and you have it always under control. Now in a great many places they do not use the whip roll, but they have a larger drum. The cloth comes down, and picks up, more like our washers of to-day.

Position of Guide Rack

A. K. Innes—I think many tie-ups are caused by the position of the guide rack. If the guide rack is high above the level of the liquor, it is often dropped down.

Mr. Leitch—Would you have the guide rack above the whip roll, if you had a whip roll?

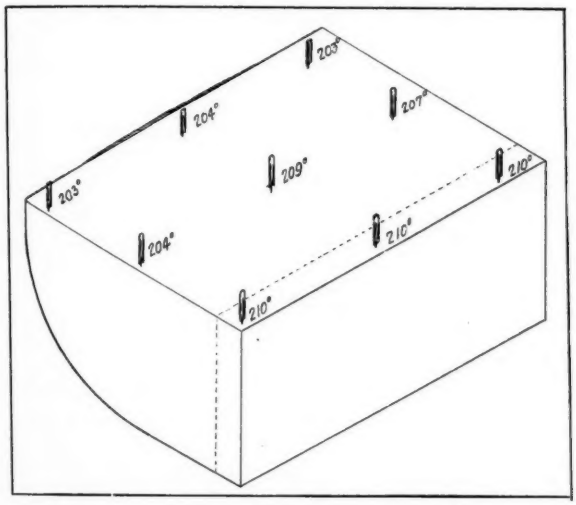

Fig. 19

Mr. Innes—I think that would be a good position for it. When the guide rack is down low the tie-up does not have a chance to drop.

Mr. Paisley—I do not think it would be a good position because when the cloth is put in, in that way, it is likely to lap. If you raise your whip roll and guide rack accordingly you will have no trouble. Your guide rack is supposed to be just below the whip roll.

Mr. Putnam—I will agree with Mr. Paisley on that.

Mr. Leitch—Is there any change in guide racks that anyone wants to talk about?

Mr. Paisley—I do not think the rack has much to do with it. I think your false front and the shape of the tub have as much as anything to do with it.

Mr. Leitch—Would you revise the dimensions of this tub?

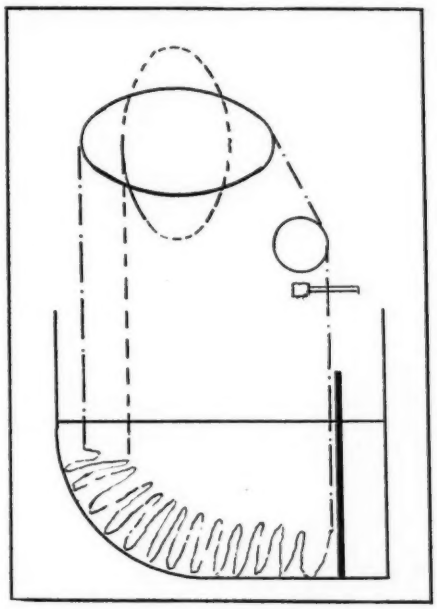

Fig. 20

Mr. Paisley—There are kettles on the market to-day where you will not get more than 7° F. difference between the front and the back. (See Fig. 19.)

Mr. Leitch—What I meant was the length of the kettle. Would you approve an 8-foot length and a 5-foot or 5½-foot over-all depth?

Mr. Paisley—Five and one-half feet is perfectly all right in depth, but if you want a kettle, the idea to-day is to get a kettle that will handle all of the qualities.

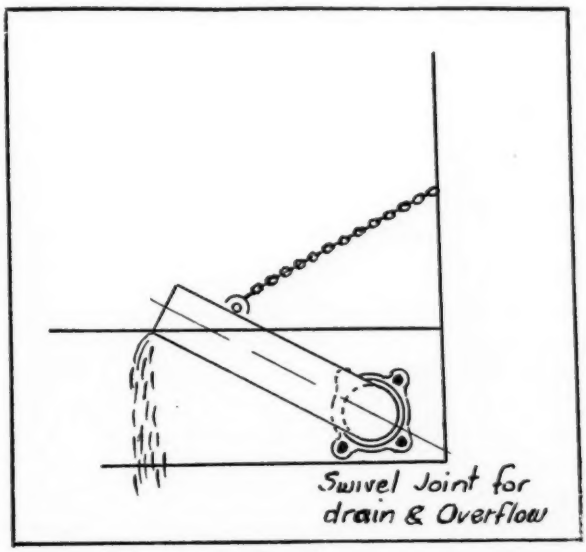

Fig. 21

That is, to jump from a 4-ounce to a 32-ounce piece of cloth. A 5½-foot kettle would not take care of the 32-ounce. It does not allow enough for a 32 or a 30-ounce piece of cloth, but if you are running a 6-ounce it would be all right.

Mr. Leitch—In other words, you would like a type of kettle which is deep, and would run it shallow, with light goods. In buying a kettle you would select a deep one.

Clogging of Reel

Mr. Paisley—You spoke about your reel clogging and I do not agree with that. You have got your water level probably where the cloth would just strike the water's edge. On the slope of your kettle, the cloth and the water should strike at about the same place.

Mr. Leitch—If you are running light goods, how would you run the water? Would you run the water at the same level, or put in more goods?

Mr. Paisley—If you are running light goods, you could put in anywhere from six to eighteen pieces in the kettle depending on the weight of your goods. The reason also that they put a cloth covering on a slat reel is not altogether to stop the slipping. Many dyers will have what we call a trailer on light-weight goods in an 8-foot kettle. Instead of dividing up the guide rack into sixteen spaces, they will put the pieces in pairs, one piece sewed end to end and the other running around as a trailer. If you have a slat reel without covering it, your loose end will drop between the slats and cause a tie-up.

Mr. Leitch—Have you any more questions or remarks?

Mr. Putnam—I would like to hear somebody comment on the piling up of a piece of cloth before it enters the dye bath, after leaving the reel.

Mr. Paisley—On your elliptical-shaped reel that you spoke about, that is, the condition of your cloth as it strikes the liquor and the way it piles in the dye kettles. (See Fig. 20.) On the regular round drum it is merely piled on top, and if you have not the right curve here [sloping side of kettle], it will fall over and then you are pulling from the bottom. If you do have the right curve here it will slide along, and I do not think it makes much difference in the shape of your reel. I have tried both. I have also found that driving the whip roll in conjunction with the reel is a help, if your goods are very light. In your average dye kettle you have about six yards out of the liquor all the time. From your water level to your water level you have six yards of cloth and on a very light fabric I think it is best to drive the roll as well as the reel.

Mr. Putnam—One other point in regard to reels: I was speaking about running in a continuous length, open width, with the kettle loaded to absolute capacity. This particular type of goods was plush, weighing about 20 ounces to the yard. This particular mill did not use an elliptical reel but a triangular reel, producing a plait or fold of perhaps 10 inches. If a smaller reel were used, either round or triangular, you would get mussing or falling of the pile. By making the fold larger (by using a larger reel), so much weight is taken off that you can get much more cloth into the liquor without injuring the pile, whereas by any other arrangement you would have to cut down the amount of cloth. Six pieces can be handled in continuous length readily enough providing there is a big enough fold. That is why I say it is such an advantage to utilize the total dyeing liquor. I think a good many times we could dye just as well in a small volume of liquor providing we used all that volume. Piece-dyeing kettles are a study.

Mr. Leitch—That is a good remark to end with, I think. (Applause.)

Chairman Cady—I think, gentlemen, with all the data we have accumulated this evening, the Research Committee of our Association should be able to draw up specifications for an ideal kettle.

Mr. Grady—I move a vote of thanks to the speakers of the evening.

Motion seconded, the question is put, Chairman Cady saying: Those in favor will indicate by rising. The meeting is adjoined.

(*Meeting closed.*)

Applicants for Membership

Dempsey, Norman P., dyer, Ellis Mills, Inc., Monson, Mass. Sponsors: W. S. Williams and E. A. Sherburne.

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Harkavy, Samuel S., color chemist and colorist, Heller & Merz Company, 505 Hudson Street, New York City. Sponsors: Russell M. Carlisle and Philip H. Stott.

Houston, J. W., New England sales manager, General Chemical Company, Hospital Trust Building, Providence, R. I. Sponsors: A. N. Dana and A. Newton Graves.

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Remington, John M., boss dyer, The Everwear Hosiery Company, 410 Tenth Street, Milwaukee, Wis. Sponsors: A. T. Brainerd and Walter S. Paddock.

MACY'S TELLS SHOPPERS NOW WHAT "WASHABILITY" MEANS

Three Methods Given on Tags to Cure Complaint Evil

Washability of textiles has given rise to more customer complaints than any other single factor, according to an executive of R. H. Macy & Co., world-famous New York department store. In a practical effort to cure the evil of misleading washability claims for the merchandise that it sells, Macy's has adopted a new guarantee system under which the store will not only guarantee the washability of fabrics but will also prescribe the washing method which is to be followed for each type of merchandise.

Most significant to readers of the REPORTER is the news that the three washing methods laid down by Macy's bureau of standards are based on the recommendations of the American Association of Textile Chemists and Colorists. This choice was reached after the store's laboratory had tested hundreds of kinds of material by various methods and in various washing conditions. "Method L" will be that of the regular commercial laundry; "Method C," that requiring careful washing, and "Method O," that of ordinary home washing.

For some time R. H. Macy & Co. have been guaranteeing the exact material content of its merchandise by chemical and microscopical test. But it has been found that numerous complaints involving washable goods have been due to the customer's lack of acquaintance with proper washing methods, while others arose from the misstatements by sales clerks improperly informed. Manufacturers, laundries and the public have suffered in this confusion.

"We are going to meet the issue squarely," declared an executive of the store in commenting upon the new guarantee plan. "It will require a considerably increased amount of testing by our bureau of standards before merchandise is offered for sale, but we feel the effort will be worth while in added good-will of the public.

WILL HELP MANUFACTURER

"The co-operation of the thousands of manufacturers and vendors who supply the store with our merchandise is being secured. Hereafter, when orders for merchandise are placed with them, washability and the standard method of washing to be used will be agreed upon in advance, so that the store's guarantee may be upheld.

"The new system, we believe, will aid the manufacturer in eliminating unfair competition due to the substitution of inferior merchandise; it will avoid misunderstanding, reduce losses from the return of unsatisfactory merchandise and build increased consumer acceptance for his product."

The three standard washing methods adopted, one of which will be prescribed for every washable fabric or garment sold by the store, attempt to simplify and improve the technique of washing. With their use it is expected that consumers will obtain much more satisfactory results. A description of the three methods follows:

Method "L"—Commercial Laundry

Directions: Dissolve thoroughly any good grade of soap, soap powder or soap flakes in hot water. Use enough soap to produce rich suds. Do not boil. Water just starting to steam (160° F.) is sufficiently hot. Rub as much as necessary. Rinse thoroughly in water at 98.6° F. and dry in current of air at ordinary temperature. Iron with hot iron.

Remarks: If directions are followed, this article will not stain, alter in color or appearance, or shrink appreciably.

Note: A shrinkage of 5 per cent in either or both directions is considered permissible. This article may be sent to any good commercial laundry. It is guaranteed to withstand the usual standard bleach treatment.

Method "C"—Careful Washing

Directions: Dissolve thoroughly "neutral" soap, such as Lily White Flakes, Ivory Flakes, Lux or Fab, in hot water and add cold water until wrist temperature (98.6° F.) is reached. Use enough soap to produce rich suds. Wash article as quickly as possible without rubbing or twisting. Rinse thoroughly in clear water at wrist temperature. Do not dry directly in sun.

Drying and Ironing Instructions

(Check Method Recommended)

Dry quickly in current of air..... [ ]
Dry between towels..... [ ]
Place on form and hang to dry..... [ ]
Spread flat, shape and dry between towels ..... [ ]
While still damp, stretch to original shape and press on wrong side with warm iron ..... [ ]
Iron with warm iron..... [ ]
Iron with moderately warm iron..... [ ]

Remarks: If directions are followed, this article will not stain, alter in color or appearance, or shrink appreciably.

Note: A shrinkage up to 5% in either direction for woven materials is considered permissible. Due to the nature of knit wear, a shrinkage up to 10 per cent in either direction is considered permissible.

Method "O"—Ordinary Home Washing

Directions: Dissolve thoroughly any good grade of soap, soap powder or soap flakes in hot water. Use enough soap to produce rich suds. Do not boil. Water just starting to steam (160° F.) is sufficiently hot.

Rub as much as necessary. Rinse thoroughly in water at temperature (98.6° F.) and dry in current of air at ordinary temperature. Iron with hot iron.

Remarks: If directions are followed, this article will not stain, alter in color or appearance, or shrink appreciably.

Note: A shrinkage up to 5 per cent in either or both directions is considered permissible.

RIVALRY IN CHEMICALS

(An Editorial from the Manchester Guardian Commercial)

IT is strange that in the United States, where there are so many big corporations and the impulse towards mergers and consolidations has been so strong in most branches of industry that the State deemed repressive legislation necessary for the national well-being, the chemical trades should have remained in the hands of comparatively small firms. Possibly this is because the American mind turns more easily on the problems of physics and engineering than on those of chemistry; the chemistry of to-day remains almost wholly the product of British and German research, while the chemical trade of the world is dominated by two firms—one British and the other German. These two—Imperial Chemical Industries and the I. G. Farbenindustrie—might almost be called the nationalized chemical industries of their respective countries; beside them a representative American firm such as the Du Pont de Nemours & Co., despite its growth last year, is a mere pigmy.

These two great firms stand as rivals, and both have been assiduously endeavoring to strengthen their positions by extending their interests. I. C. I. has been forming associated sales companies in the Dominions and colonies and in the countries of Latin-America, preserving its manufacturing side for this country and to a less extent the Empire. I. G., on the other hand, has been pushing out into the French dye industry, with which a provisional agreement regarding production and sales was reached at the end of 1927, and more recently into the Swiss dye trade also. Permanent agreements with both the French and Swiss industries were reached recently, and with them the I. G. takes not Germany alone but the Continent as its workshop, and its sales organization promises to be as far-reaching as that of its rivals. Its latest development is the formation now announced of the American I. G. Corporation, which is to raise immediately £6,000,000 capital in the United States. Presumably this is a counterstroke to the Finance Corporation of Great Britain and America, which, it will be recalled, was formed last year by I. C. I. in conjunction with the American banking house, the Chase Securities Corporation. But while the Finance Corporation's activities are limited to matters of capital the new American I. G. would seem to have a wider scope. The directorate includes the presidents of the Standard Oil Company and the Ford Motor Company, as well as two eminent bankers, and since the Standard Oil Company has concluded an agreement with the I. G. for the American rights of the Bergius process of coal distillation and the I. G. holds majority stocks in two important chemical concerns it seems certain that the new company intends to make an attack on the American chemical trade from the manufacturing side.

There are thus these two huge structures facing each other, the one centered in Britain and looking to the British Empire as its market, the other over-running the Continent, and apparently contemplating nothing less than the capture of the entire world market. Both are seeking financial strength in America. In the past attempts have been made to bring about some form of understanding between them, but these have all proved fruitless, and it is evident that the I. G. is in a combative mood.

The world as a whole tends to depend more and more on chemicals, even for the necessities of life; food, clothing, and all the other needs of a growing population can only be provided in sufficient quantity without risk of a rise in prices if artificial fertilizers are used on an increasingly liberal scale; manufacturing processes in all trades are more and more chemical in character. If this expanding world market is to be in the hands of these two concerns their rivalry may be no bad thing for the world, for competition is not without its advantages in maintaining low price and a high quality of product. But the prospect of the dependence of the rest of the world on I. G. and I. C. I. as arbiters of fortune and future is less pleasant; they are both far too powerful for their quarrel not to be dangerous to the multifarious enterprises that depend on them, and their union would mean a monopoly on a scale too vast to be contemplated without disquiet. And who shall rule these rulers? It is clearly a question that cannot be left to the trusts themselves.

"D.SC." CONFERRED ON STUART CRAMER

Because of his distinguished service as inventor and author, textile manufacturer and social philosopher, Stuart Cramer, of Cramerton, N. C., was awarded the degree of doctor of science at the commencement exercises of North Carolina State College. Dr. E. C. Brooks, in making the presentation, paid tribute to the distinguished visitor and his achievements.

Said President Brooks of the college: "Your notable contributions to the social and industrial progress of your country, and especially of North Carolina, your native State, have merited for you a unique distinction which combines the attributes of a patriotic American citizen and a wise and very successful captain of industry."

Peter J. Arnold, connected for the past sixteen years with A. Klipstein & Co., of New York, is now covering the Massachusetts territory for Philipps Bros., Inc., of Boston, ores, metals, residues and chemicals.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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LORDS OF A GREAT DOMAIN

THE public distrusts a hysterical newspaper. The habit of forever jumping to a soap-box and denouncing in excited rhetoric any and every movement that appears to threaten public welfare does not win the confidence of any periodical's readers. It may attract notice and draw some applause at first, but the crowd soon comes to suspect that the whole show is staged only to draw attention and that public welfare is not really endangered at all.

There has recently occurred an event that offers many opportunities for growing hysterical over our industry's welfare. American capitalists have financed a foreign enterprise, an American branch of the German dye trust, and the act has stirred our chemical industry. The menace to our national interests of such an alliance of American capital and foreign industry has already been explained at length in the columns of the REPORTER and other journals. For this reason we hesitate to revive the subject by further comment, since there may be some who will charge us with exploiting something which can easily be dressed up to look dangerous and which therefore makes excellent tinder for a flare of soap-box rhetoric.

On the other hand, this may be one time when the welfare of the industry is really threatened. In this case public interest must be aroused carefully, for if the trade press should appear to be merely playing the role of alarmist it may lose the precious confidence of its readers at the crucial moment when that confidence is most necessary.

An editorial in the Manchester Guardian Commercial commenting on the formation of the American I. G. impels us, however, to take this risk of seeming to play up a subject that has grown cold. We reprint the English article on the opposite page. Great Britain has, in her Imperial Chemical Industries, Ltd., a chemical trust that is far too strong to be seriously menaced by the American I. G. or by the old German I. G. Plainly, then, the warning uttered by the Manchester Guardian is one for Americans to heed. That it comes from a disinterested quarter makes it all the more convincing.

The main theme of this British opinion is expressed in the assertion that "the chemistry of to-day remains almost wholly the product of British and German research, while the chemical trade of the world is dominated by two firms, one British and the other German." In closing, the Guardian editorial asks, "Who shall rule these rulers? It is clearly a question that cannot be left to the trusts themselves."

If the day ever comes when America and her industries must depend for most of their chemicals upon these two great European trusts, then truly public welfare will be endangered. Who dares question this? Or is it necessary to point out that the American chemical industry is not so strong as it might seem? We may believe that we have a trust or two, but what we regard as a trust is nothing more than several companies in allied lines of manufacture combined to form a larger unit. To the Germans and to the British a trust is a cartel like the I. G., made up of many smaller trusts. The parent cartel may control five or ten powerful units and each unit will comprise in turn not one but a number of related though diversified enterprises. It follows that the products of an amalgamation like the I. G. or the I. C. I. are the products of many industries, and all raw materials are controlled and exchanged within the cartel. There is vertical dependence of one unit upon another and close team-work between them that reduces waste, competition and research effort. The whole structure is like those nests of children's blocks which fit into each other. We have nothing like that in the United States.

A trust of this complex character is most dangerous when its products are essential to the life of its consumers. A sulphur match trust, for instance, could hardly be called a menace because its domination in any country could easily be overthrown by the use of substitutes for matches, of which there are several. But there are no substitutes for chemicals. As the Manchester Guardian observes, "The world as a whole tends to depend more and more on chemicals, even for the necessities of life."

Any trust that is too large and uncontrolled by legislation may become a menace in its own country. But how much greater is the menace of a foreign cartel or two foreign cartels that dominate the world markets for such vitally essential products as chemicals? Both the I. G. and the I. C. I. have grown too large to be controlled and if one of them cannot defeat the other they may join forces.

Shall we and others be branded as hysterical demagogues if we censure the perfidy of our bankers who have helped to finance such a potential menace to national welfare as the I. G. or the I. C. I.? Is there to be a cry of "narrow nationalism" wherever a warning is sounded

here against permitting two European powers to build up huge amalgamations so heavily capitalized that they can buy up or undersell any undesirable competitors?

For that, in a sense, is what the I. G. has recently attempted in France and in Switzerland in effecting pacts with the Etablissements Kuhlmann and other large French chemical firms and with three Swiss dye interests, whereby export sales and technical research are bargained for. The American I. G. is a pact of a different stamp, but it illustrates the centipedic nature of an international power like the I. G. The Imperial Chemical Industries likewise wrapped a tentacle around American capital not long ago in its deal with the Chase bank. Where in the United States have we a chemical enterprise so well financed and so extensive in scope as these foreign cartels?

The danger of domination by two such powerful rivals lies deeper than any immediate effect on our export trade in chemicals and dyes. It lies in the financial power which these trusts may exert by undertaking research on a tremendous scale, through which they can advance more rapidly in organic chemistry than our scattered industry, not alone in manufacture but in all fields of science. By their practice of constant patenting in Washington along every step of their progress they can outstrip our most ambitious projects and block our advance.

Not often does the REPORTER make noises like a trust-buster on a soap-box. But the situation which the American chemical industry faces to-day calls for thought and planning and action. There is an unhealthy lassitude in some quarters which must be dispelled, and even at the risk of dropping into sensationalism the most striking angles of the problem should be displayed.

The remedy that is implied must not, however, be misunderstood. A great American chemical trust is not here advocated. But we should organize in our industry two or three large, well-capitalized units stronger than any now existing here, which could support one national research staff so well equipped as to keep pace with our foreign rivals regardless of any further deals which they may make with American interests. In times of strife our two or three chemical trusts could be permitted to combine into a cartel strong enough to swing hard at any European bully that shook a fist under our nose.

SELLING BY SMELL

THE chemist's test tube and the dry goods showcase are sisters under the skin—or under the glass. Both are essential factors in the merchandising of textiles over the counter. But were it not for the test tube, the showcase would have very little to show. For the laboratory has fathered and mothered all the beauty that any piece of fabric may possess, not only the beauty of color and luster but also the "feel."

And now, as we learn in the article by Dr. Donald Laird in this issue, the beauty of textiles may be increased by a new appeal. Shoppers can now be drawn to the dry goods counter by the aroma of its wears. To the visual appeal of color and luster and brilliance and the tangible appeal of velvety softness or silken smoothness, the manufacturer of fabrics can now add a far more delicate quality—fragrance.

Surely, without our chemists even queens would be wearing flour sacks for evening gowns, and they would be mighty poor sacks at that. But the buyer accepts all the beauty of a fabric with as much nonchalance as a fish accepts the water. Still, the perfection of textiles from the homespuns of old to the finest fabrics of to-day, colorful, sheer and fragrant, has not been the work of long centuries of craftsmanship. Within our own generation the chemist has brought about improvements that apparently leave little more to be done. Adding the quality of fragrance may seem like the finishing touch. Nevertheless, the history of past researches has demonstrated that we shall probably never give to textiles their *last* touch of beauty. What we carelessly call "perfection" is a continuous process.

CHEMICAL FRANKNESS

(*From the New York Herald Tribune*)

THE Chemical Exposition, which played to capacity houses in Grand Central Palace, was an interesting spectacle to any business man even if he did no more than stand and watch the crowds go in, as a certain distinguished motion-picture magnate is said to have done years ago in front of a nickelodeon before deciding that here was a business in which his first $800 might find room to grow. Were no other evidence at hand, present public interest in chemistry is proof enough that this youngest branch of technology has arrived at adult stature in public estimation no less than in the satisfactory bulges of its bank accounts. Thirty years ago so many people interested in the science, even by curiosity, would have been unthinkable.

The American chemist has had the bad luck to be overcast, these last two generations, by two of those substanceless ghosts which so often darken the skies of industries no less than of superstitious minds. One shade was the myth of the absent-minded professor; the persuasion, once all but universal, that chemists were unpractical folk, good for nothing in the business world except to use up space and materials or to stimulate the tailoring business by burning holes in a certain average number of trousers every year. The succeeding shade, an idea still not altogether dead, was the myth of the mysterious German. No one whose training in chemical science originated more than a hundred leagues from the Rhine was believed able to compare for an instant, whether in brains or in magic working in the factory, with the products of that marvelous if slightly misty school. Time, as usual, has dealt effectively with both

these ghosts. Chemists are now created of American clay as respectably and energetically as elsewhere.

The post-war years brought days of chemical tribulation. Factories were too large; sales forces were disorganized; workmen, chosen haphazard in war time, were not the best. How these conditions have been cured so quickly will be a worth-while lesson, once some able pen describes it, to other industries. One thing that has helped, it seems to us, is a characteristic of American chemical industry unknown in its German predecessor. This is frankness. American chemists hug few secrets. Competitors are likely to be welcome in factory or laboratory. At the meetings and in the publications of that admirable institution, the American Chemical Society, facts learned in one factory are made available to others. The taste of present success is proof of this policy's wisdom. Whatever may be true of passengers to Gehenna, chemists have learned that not always or often do upward travelers move fastest alone.

EXTRACTORIALS

Textiles from test tubes have done more toward creating a world democracy than laws or wares. With rayon and dye plants in all of the countries of the world, what will become of classes and caste systems when we no longer have the aristocracy of dress?—*Pauline Beery Mack, in Journal of Chemical Education.*

The successful mills are those that have confidence enough in the future to purchase modern machinery instead of spending their money for handkerchiefs to stifle their sobs and absorb their tears.—*Textile Colorist.*

The work that rayon chemists and rayon technologists have been doing on cellulose, a work in which the entire rayon industry of the world has taken part, is helping much to clarify the technical situation with regard to the properties and behavior of cellulose.—*Rayon and The Rayon Journal.*

All machines used in the textile industry are out of date. None of them has really received the close scientific study and analysis which the precision of scientific instruments to-day permits to be carried out with the greatest accuracy. Like any other machines the design of which, on broad lines, dates back to the early part of the nineteenth century, they have been developed as a result of what might be called flashes of inspiration of comparatively few men, and they fall short of practical perfection because their imperfections have never been subjected to close scrutiny.—*Tizard, in Journal of the Textile Institute.*

The industrial development in our country has so diversified and altered its requirements that, whereas twenty-five years ago there was small demand for men with extensive training in organic chemistry, to-day many industries require organic chemists in a ratio of ten to one, as compared with other branches of applied science. . . . We want our educational institutions to prepare not merely graduates in chemistry but chemists.—*Industrial and Engineering Chemistry.*

It is only a question of time before organized fundamental research in the textile industry along technical lines becomes an accomplished fact—just as organized economic research is now an achievement.—*Douglas G. Woolf, in Textile World.*

JOHN C. HEBDEN DIES IN PROVIDENCE

Noted Chemist Stricken While on Visit

John Calder Hebden, widely known as a chemical engineer, and co-inventor of the Franklin dye process, died on June 3 after an illness of six weeks. Formerly a resident of Providence, he was on a business visit to that city when taken ill.

Mr. Hebden was vice-president and general manager of the Dyeing Process Corporation of Providence and vice-president of the Hebden Sugar Process Corporation, and at the time of his death was a member of many prominent chemical societies.

Mr. Hebden's home was at 8807 Ridge Boulevard, Brooklyn, and his office at 52 East Forty-first Street, Manhattan. He was born in Colgate, Wis., December 22, 1862, the son of John and Mary Calden Hebden, and was graduated from Mount Pleasant Academy, Providence, and in 1885 from Brown University, where he engaged in post-graduate work from 1901 to 1903.

From 1885 to 1887 Mr. Hebden was employed as chemist and dyer by the National and Providence Worsted Mills and the Silver Spring Bleachery. For the next seven years he was resident agent, technician and chemist for William J. Matheson & Co. and the Cassela Color Company. He became vice-president of F. E. Atteaux & Co. in 1909, and then went with the Franklin Process Company.

He was a member of the American Chemical Society, the American Institute of Chemical Engineers, the Society of the Chemical Industry, the Society of American Military Engineers, the Societe de la Chimie Industrie of France, the Chemists' Club of New York and the University Club of Providence.

Special emphasis is placed upon tones of brown with a copper cast in the wide range of colors that have been selected by the Textile Color Card Association for fall apparel. The new Fall Color Card was issued last week by the association and comprises eight-two shades.

SPRING MEETING OF TEXTILE RESEARCH COUNCIL

(*Continued from page* 378)

curves for both loading and unloading might be given special attention from the knitting standpoint. There is usually a pronounced curvature at the beginning of the curve and a return in very much the same form. While applying tension to the yarn this portion of the curve represents a tightening up of its structure. If the curve is repeated in reverse order on unloading, it indicates an elastic return, due not so much to stretch and recovery in length as to change in form of individual fibers and their return. It is quite possible, therefore, that the relations here may indicate stiffness or pliability, and therefore give some clue as to looping and knitting quality."

William D. Appel explained that the purpose of his talk was not to present the results of a finished research, but merely to give his audience a glimpse of studies now in progress on a problem of considerable moment to the dyeing industry. Despite the great age of the art of dyeing, he said, the laws relating to the amount and kind of dye used and the color produced have never been worked out in a quantitative way. Dyeing continues to be an empirical, cut-and-try process. The study outlined by Mr. Appel is concerned with the quantitative relation between the spectral reflection of textile dyeings and the amount of dye used. He said in part:

"The practical dyer may look askance at our experimental method for making dyeings. Yet if we can eliminate all the variability in the fiber to be dyed and in the details of applying the dye to it—in other words, if our dyeings are reproducible, then one of the greatest difficulties in the way of this study has been overcome.

"The method of color measurement that is being used in the work I propose to describe to you is entirely different from the usual method of visual comparison. In fact, 'color,' the mental sensation, is not measured at all. By not measuring 'color,' those difficult and confusing questions concerning the color vision of the observer and the illumination of the dyeings are avoided. What is measured is the reflection of the dyeing for radiation of definite wave lengths in the visible spectrum relative to the reflection of a standard white material. This gives a complete description of the dyeing, which is unique and sufficient for a more direct expression of the color sensation. It is by direct use of the spectral reflection data that many of the difficulties of 'color' measurement are avoided.

"Although some progress has been made, this study is still in what may be called the academic stage. However, the results that have been given point clearly to an ultimate practical outcome. It is not too much to expect that at some future date the textile dyer will be supplied with spectral reflection measurements of a color to be produced and that from data for the dyes at his disposal he will be able to select the best dyes and to calculate the amounts of them to use to produce the desired color without delay and without making a single trial dyeing."

DIPLOMAS AWARDED TO LARGE CLASSES AT PHILADELPHIA TEXTILE SCHOOL

Diplomas and certificates were awarded to the graduates of the various courses in textile manufacturing and processing given by the Philadelphia Textile School at the commencement held June 6. Fourteen students received the diploma for completing the regular textile course and four for the chemistry, dyeing and printing course, and partial course certificates for day and evening school courses were awarded to a large number.

The two-year scholarship awarded to the first-year student attaining the highest standing in color appreciation and application, given by the Textile Color Card Association, was awarded to Richard Kerr Palmer.

A partial list of those receiving diplomas follows:

Regular Textile Course

Benjamin Price Anderson, Edgar Stanley Bowers, Jr., William John Bragg, Prescott Williams Brown, Walter LeRoy Brown, Otis Wells Coggeshall, Henry Crumbliss 3rd, Robert Saxman Cunningham, Norman Duberstein, Donald Euen Morgan, Henry Augustine Ostermann, Jr., Franklin Raub, David Emil Singer and Russell Edward Woerner.

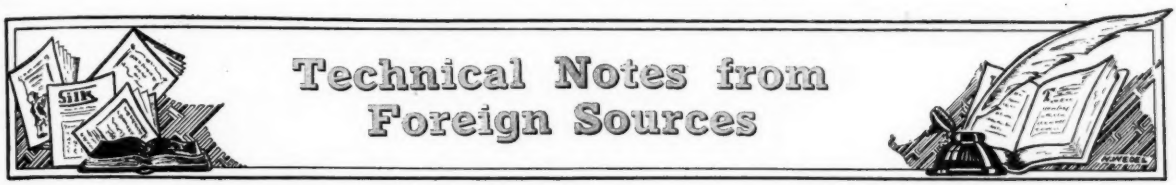
Chemistry, Dyeing and Printing Course: Moe Amsterdam, Henry Charles Hennig, Carl Julius Spengler and William Frank Uhlig.

Full Course Certificates—Day Classes: Cotton course (two years): Harold Winston Carpenter and John William O'Neal. Silk course (two years): Paul Henry Bittner, Kenneth Brancato, Louis Emil Katz and William Edwin Wintrich. Wool and worsted course (two years): John Dunbar Comins, Joseph Paul Condon, Andrew Scotland Mackenzie, William Barnet Stern and Herman Wittig.

Full Course

Full Course Certificates—Evening Classes. Regular textile course (three years): Reginald Hayes, Elmer B. Kapes, Edward Town Taws, Edmund Hugh Thomson, Jr.

Chemistry and Dyeing Course (three years): Edward Charles Diehl, Arthur William Etchells, Joseph Patrick Hoey, Franklin James Leicht, Jr., George Mauritz, Harry Joseph Parker, Fred Rhodes, Raymond Schaefer, George Wilkinson Schladensky, William Frederick Schoellhorn, Henry Conrad Schuffels, Alton B. P. Siddons and Charles Buckley Wood.



A Study of Naphthol AS on Cellophane

Dr. Gustav Schwen; Mell. Textil-Ber. 9, 673 (1928)

AS is generally known, Naphthol AS dyeings are subsequently soaped hot to increase their fastness. It may be considered as self-evident that, with a large number of Naphthol AS combinations, an aggregation of small particles of the pigment, or, to use a colloido-chemical phrase, a transition from a highly-dispersed to a coarsely-dispersed condition, may be brought about by the soaping process. A number of investigations in this field have already been published. Haller[1] was the first to establish, in the hot soaping of para-red dyeings, an aggregation of fine particles of the pigment into coarser ones, dyestuff free spaces being left where the finer particles had migrated to the areas of aggregation. On the connection between fastness to light and aftertreatment at the boil, of Naphthol AS dyeings, Loechner[2] and Kayser[3] have published papers. Lint[4] has written on the causes of blinding on artificial silks when dyed with compounds of the Naphthol AS series. Ruperti[5], in his work published a year ago, has reached conclusions similar to those of the above workers.

From the increase in the size of the particles of the coloring matter, on boiling in a soap bath, may be explained on the one side the change of color tone in this operation, and on the other side the increase in fastness to light; in which case, however, other influences, as, for example, the altered light-ray absorption, as a result of alteration in the color tone, may play a concurrent part.

Independently of the above-cited researches, we have followed up the question whether, in the case of Cellophane, which is hardly other than viscose, but which, being a transparent mass, allows optical alteration of dyeings to be more easily recognized than in the individual fibers of cotton or of viscose, processes of change might not be made visible, which otherwise would be impossible or at least difficult to study. In addition, in Cellophane we enjoy the further advantage of homogeneity of structure, in contrast to cotton fiber, which as a consequence of its organic origin consists of the well-known three parts of cuticula, cell wall, and lumen.

The Naphthol AS dyeings on Cellophane were made as follows: Sheets of the material, of about 50 mμ average thickness, were treated with the soda alkaline solution of the Naphthol as usual for cotton, wiped off with a tuft of absorbent cotton to remove superficial material, and then developed in a solution of the diazotized base, previously treated with sodium acetate to neutralize the mineral acid. Additions of formaldehyde to the padding bath, or of acetic acid, aluminium sulphate, and salt to the developing bath were not made.

As the first example of such a coupling on Cellophane, the combination Naphthol AS-SW + Fast Red KB Base may be mentioned; this example is chosen because it occurs prominently in the publications mentioned above. If one treats Cellophane with a solution of 0.1 g. of Naphthol AS-SW per liter for ½ hour, and without drying (actual drying?—Tr.) couples it with the diazo solution from Fast Red KB Base, a yellowish-red, transparent dyeing is obtained. That this dyeing is really transparent is convincingly evident at first glance, since one would expect that the combination (the pigment produced), which is completely insoluble in water, would also be insoluble in Cellophane, and consequently should make the latter opaque. It would lead us too far afield to inquire into the reasons for this phenomenon. Under the microscope such dyeings appear homogeneous; and only under the ultra-microscope do particles appear visible. If one raises the quantity of Naphthol AS-SW to 0.5 g. per liter, the sheet of Cellophane appears externally to be no different—except, naturally, that this dyeing is deeper in shade—but under the microscope individual particles are now visible. These particles are visible even in the unsectioned sheet at a magnification of 400; one obtains very handsome images on sectioning to 10 mμ in thickness and viewing at a magnification of 1,800.[6] On raising the amount of the Naphthol to 2.0 g. per liter, the increase in the coarsely dispersed part results, even to external inspection, in the dyeing appearing a little more muddy by transmitted light, and in reflected light a little more dull than before; under the microscope very many particles are to be observed. This particular combination, of Naphthol AS-SW and Fast Red KB Base, appears therefore to possess an extraordinary inclination to aggregate, even without aftertreatment in the heat.

If, now, the Cellophane dyeings so prepared are subjected to an aftertreatment at the boil,[7] such as is customary for cotton goods dyed with Naphthol AS, "covering"[8] dyeings are obtained. Undyed Cellophane hardly alters with this treatment, and even under the microscope and ultra-microscope no alteration is to be detected. With the dyeings which were prepared with 0.1 g. of Naphthol AS-SW per liter, the effect of the acquisition of this property of "covering" is still very slight, but a decided change from yellowish-red to bluish-red is to be observed finally. With the heavier dyeings this covering power is so strongly developed that even by external observation one gains the impression we can see in all the dyeings made with Naphthol AS-SW and Fast Red KB Base and soaped at the boil, very thickly aggregated particles of the pigment, which are the larger and thicker[9], the

more heavily the Cellophane was padded with the Naphthol AS-SW. It should be noted that this covering power is produced not only by hot soaping, but by any sort of treatment in the heat in presence of water, and that it does not occur if essentially dry heat acts upon the dyeing. This is due to the fact that the particles of pigment can "ball together" only when the Cellophane mass is sufficiently swollen by water. This phenomenon of the transparency of the unsoaped Cellophane dyeings, and their becoming "covered" on soaping at the boil, is to be noticed in a very great number of Naphthol combinations. Any regularity which governs what combinations will "cover," and which will not, has not as yet been discovered. On the other hand it appears to be certain that dyestuffs of reasonably large molecular weight is rather small, owing to their lesser mobility in the medium; thus, the diazo dyestuffs—especially the combination of Naphthol AS-G and AS-BR as well as those from Fast Blue B Base—assume only poor covering power on the hot soap bath treatment. But the dyestuffs from beta-naphthol assume good covering power very easily; indeed, it is possible to obtain covering dyeings with beta-naphthol + 3-nitro-4-toluidine even in the cold, when coupling takes place in an acid medium.

The observation has further been made by J. Hassmann, of the I. G. (Leverkusen),[10] that, with certain Naphthol combinations which on hot soaping strongly alter their color tone and through this alteration are improved in fastness to light, a subsequent very hot ironing—250° C. and over, therefore at temperatures which can hardly come into our consideration—a displacement of the color tone in the direction of the unsoaped dyeing's tone, and a diminution of the fastness to light, is brought about. If, as already mentioned, it can be assumed as evident that the change in color tone and the improvement in fastness to light through an aftertreatment at the boil is caused by an increase in size of the particles of dyestuff or pigment, it may be concluded, from what has been said that by very hot ironing a de-aggregation of the particles takes place. A similar view is expressed by Haller in his work on the fastness to ironing of substantive dyestuffs.[11]

After we had succeeded in making the increase in size of the pigment particles so plainly in Cellophane, the question arose whether a return to the transparent condition might not be brought about by very hot ironing of hot-soaped Cellophane dyeings, which naturally would point to a de-aggregation of the particles of pigment. The following combinations were carefully studied:

Naphthol AS-TR + Fast Orange GC Base
Naphthol AS-SW + Fast Bordeaux GP Base
Naphthol AS-SW + Fast Orange GR Base
Naphthol AS-BG + Fast Scarlet GG Base

First to be examined was the possibility of Cellophane itself being altered by very hot ironing. Experiments showed that the material did become a little more cloudy with heat, and somewhat brittle on account of the evaporation of the softening agent incorporated in it. But under the microscope and the ultra-microscope no essential alteration was detectible.

Now as to the combination Naphthol AS-TR + Fast Orange GC Base, it was observed that the unsoaped dyeings were transparent, and the hot-soaped ones were strongly "covering"; at the same time the color tone was displaced toward yellow. On very hot (250° C.) ironing the dyeings became transparent again and regained the color tone of the original, unsoaped dyeings. Under the microscope definite particles were to be observed in the case of all dyeings; which particles were by far most thickly aggregated in the case of the hot-soaped dyeings.

As to the other three combinations, the effect of the assumption of covering power is not so strong as with the first combination; the change in tone is the most evident change. In every case, however, on hot soaping, the same condition as before the soaping is restored. Also, under the microscope, the aspect of the unsoaped dyeings and that of the soaped ones subjected to very hot ironing are rather similar, and are distinguished from the hot-soaped ones by a smaller size of particles.

It may therefore be looked upon as proved that on very hot ironing a diminution in the size of the particles of dyestuff takes place. The question as to how this comes about remains still to be answered. According to exhaustive experiments in the most varied directions—in part with negative results—the answer appears to be fairly simple. To be precise, the melting points of the pigments involved lie about 250° C., therefore at about the same point at which the dyeings alter on ironing. The above-mentioned combinations were for the purpose of examination prepared as solids from molecular amounts of the Naphthols and the Bases in aqueous solution, filtered, dried, recrystallized from glacial acetic acid, all dried *in vacuo*. They showed then the following (corrected) melting points:

Naphthol AS-TR + Fast Orange GO Base, 239.5°-243°
Naphthol AS-SW + Fast Bordeaux GP Base, 251°-252°
Naphthol AS-SW + Fast Orange GR Base, 264°-266°
Naphthol AS-BG + Fast Scarlet GG Base, 272°-273°.

The pigments not purified by recrystallization show the following (corrected) melting points (these would correspond to the condition of the pigments as existing in the dyeings):

Naphthol AS-TR + Fast Orange GC Base, 235°-236°
Naphthol AS-SW + Fast Bordeaux GP Base, 235°-236°
Naphthol AS-SW + Fast Orange GR Base, 228°-230°
Naphthol AS-BG + Fast Scarlet GG Base, 248°-249°

At about 5° below the melting point of each of the four compounds, sintering takes place.

A connection between the melting point of the pure pigments and the change in tone on ironing is plainly to be recognized.

It may be worth mentioning further that the Cello-

phane dyeings, which on very hot ironing become more transparent, in most cases offset the color on the ironing cloth badly. As to the question whether this is due to sublimation, Dr. Scholl will report in a special paper soon to appear.

By way of summary we may say that, with certain Naphthol AS dyeings, an increase in the size of the particles of the pigment is brought about by hot soaping, and that in many cases such aggregated dyeings undergo a diminution in size of particles by subsequent very hot ironing; and that, in the latter case, the melting point of the compound in question plays a great part.

[1] Mell. Textil-Ber. 6, 669 (1925).
[2] Mell. Textil-Ber. 7, 243 (1926). Name of author misspelled as Loescher.
[3] Mell. Textil-Ber. 7, 437 (1926).
[4] Mell. Textil-Ber. 8, 258 (1927).
[5] Mell. Textil-Ber. 8, 942 (1927).
[6] The sectioning and the ultra-microscopic studies were carried out with the assistance of Dr. Moll.
[7] The dyeings were treated for fifteen minutes with 2 g. of soap and 2 g. of soda per liter, at the boil.
[8] The expression "covering" is borrowed from the pigment industry; the dyeings allow light to pass through reasonably well, but incident light is reflected through particles of an index of refraction other than that of the imbedding mass.
[9] A measurement of the absolute size of particle is very difficult, since the particles are very small.
[10] Not yet published.
[11] Kolloid-Zeits. 38, 248 (1926) and 43, 47 (1927). (Translated.)

Simple Method of Determining Oil or Fat Content in Washed Weaves

Dr. Blaser u. H. Girsberger; Mell. Textil-Ber. 9, 680 (1928).—For determination of the action of additions containing hydrocarbons to wash liquors, especially in the case of smearing taking place through the presence of fats of mineral nature, etc., the following procedure has proved itself as simple as convenient. Many fats and oils have the property of fluorescing strongly in ultraviolet light. In this way very slight traces of fats or oils can be detected which otherwise would defy analytical detection. Goods which are handsomely white, and apparently cleanly washed often luminesce brightly under the quartz lamp, because the washing process used could not remove all impurities. According to the quantity of the fatty material present upon the weave, very plain gradations in intensity of the fluorescence may be observed.

In order to gain a quantitative idea of the degree of residual impurity, and to be able to state the results in definite figures, we may proceed as follows: 4 g. of machine oil are dissolved in 20 c.c. of benzene, and a strip of cotton goods 4 by 8 cm. dipped into this solution and dried. The solution is now diluted with 20 c.c. more of benzene, and a second sample of cloth likewise dipped into it and dried. Half of the solution is now poured away, and 20 c.c. benzene added, and in this solution a third sample of cloth (always, of course, of the same size) dipped into it and dried. This process of step sample preparation is continued up to perhaps eight samples. One strip takes up approximately 0.5 g. of the benzene solution, and so the oil content per square centimeter of the strip comes to:

1	3.90 mg.
2	1.95 mg.
3	0.98 mg.
4	0.49 mg.
5	0.25 mg.
6	0.13 mg.

The strips so prepared are laid in order, side by side, upon a black substratum under the quartz lamp. On illumination in a dark room there appears a fluorescence beautifully graded from step to step. The samples of washed goods under examination are compared with the standard scale, and, according to the intensity of the luminescence, rated by a particular strip of the standard scale. By a simple calculation the fatty content of the weave is determined from the size of the spot.

The scale for machine oil is naturally to be used only for work with that oil. For other fats or oils a corresponding scale must be established.

CIBA ANNOUNCES ALIZARINE RUBINE

A circular issued last week by the Society of Chemical Industry and distributed by the Ciba Company, Inc., of New York, describes the properties of a new acid alizarine dyestuff, Alizarine Fast Rubine R. Described in this announcement as a color of excellent fastness to water, washing and alkali, it may be used alone or as a shading color in the dyeing of piece goods and yarn, especially carpet yarn. It is also adapted for the shading of chrome colors, due to its chrome fastness, but draws neutrally on half wool and does not color cotton and acetate silk effects. It may be used also in direct printing for wool and silk, but not in discharge printing.

The Society of Chemical Industry has also issued a new sample card, No. 726K, displaying acid dyestuffs on wool and silk weaves. This card shows thirty-two acid and cloth fast dyes which color both threads evenly, as well as twelve dyes that reserve silk. Five different dyeing methods are recommended, based on the action of wool in weak acid baths in higher temperature. To produce pure white effects an aftertreatment with ammonimum oxalate is used once and an aftertreatment with hydrosulphite-acetc acid is prescribed the second time.

TEXTILE SCHOOL HONORED BY CAROLINA INDUSTRIAL EXPOSITION

The Textile School of North Carolina State College received a blue ribbon for its exhibit at the North Carolina Industrial Exposition held at Raleigh, N. C. This exhibit consisted of an elaborate display of fabrics and hosiery made from cotton and rayon. The fabrics were designed, woven and dyed, and the hosiery knitted and finished in the textile school by students.

LOTS OF FUN AT R. & H. OUTING

The Roessler & Hasslacher Chemical Company held its annual outing Saturday, May 25, at Glen Cove, Long Island. There were approximately 200 guests. The managers of several branch offices in the East were present.

After a spirited ball game a show was staged by the men and women employees of the company. In the evening a chicken dinner was served. Milton Kutz, vice-president and manager of sales, presented platinum watches to some employees of the company who had been with the organization for twenty-five years or more and who had not already received a gift in recognition of their services. The following employees of the company were so honored: Miss S. Dinant, Miss G. Warren, Miss J. Paulson, Miss L. Chorlton, William Mohr, J. V. Muller, Albert Reusch, W. P. Stoll, A. C. Klahre, F. A. Deisler, J. A. Brimlow, Carl Dittmar and John Baumgartner.

NEW INDANTHRENE MADE BY GENERAL ANILINE

Leaflets recently distributed by the General Dyestuff Corporation of New York describe the properties and application of several new dyestuffs, one of which, an Indanthrene color, is of domestic manufacture.

Indanthrene Olive RA, manufactured by the General Aniline Works, for which the General Dyestuff Corporation acts as sole agent, is said to correspond in shade and strength, dyeing and fastness properties with the imported type. Described in the leaflet as of excellent fastness to light, washing and chlorine, the announcement states that it is very suitable for combinations and is supplied in both paste and powder form.

Another new color announced by this company is designated as Palatine Fast Pink BNOO, which produces a bright pink shade that may be used alone or in combination with several Palatine dyes, such as the Fast Yellow GRN, the Fast Orange GN and the Fast Blue GGN, for the production of good wearing properties for men's wear and high-grade dress goods. It is further described as being of interest for dyers of worsted, knitting and carpet yarns, and for dyeing wool and fur hats.

A new red of the Supranol Series is described in another leaflet issued by General last week. Dyed from a weak acid bath, Supranol Red RX, it is stated, produces a bright scarlet shade of excellent fastness to water and salt water and of good fastness to washing, fulling and perspiration. Its light fastness, according to the leaflet, makes it of interest to dyers of woolen yarn for the knitting trade. It has good affinity for pure and tin weighted silk.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

SALES EXECUTIVE

Handled complete line heavy chemicals, textile finishes fourteen years for one firm; department superintendent in large shade-cloth mills; three years president and sales-manager of active plant; general acquaintance with manufacture and application of chrome colors, paint base, bleaching, finishing and filling of muslin. Prefers chance to build up small mill, New England, with interest in business and moderate salary. Address: Classified Box 526, American Dyestuff Reporter.

HOSIERY DYER

Thoroughly experienced hosiery dyer, over 20 years' experience on high-grade full-fashioned and seamless work, open for position; location no object. Address: Classified Box No. 529, American Dyestuff Reporter.

POSITION WANTED

High-grade executive, with complete, successful experience in worsted and woolen dyeing and finishing. Capable of taking charge of any dyehouse dyeing stock; worsted, woolen, cotton or rayon yarn; tops and mixes; piece goods. New England preferred. Address: Classified Box No. 530, American Dyestuff Reporter.

POSITION WANTED

Sales representative, with eight years' experience selling dyeing machinery in New England and Canada. Experienced dyer and finisher, and has high-grade references. Would connect with a large machinery builder for above territory, or with dyestuff house. Address: Classified Box No. 531, American Dyestuff Reporter.

SALESMAN

Salesman wanted to sell specialties to textile and dyeing industry. Must have experience and following. Give particulars. Confidential. Address: Box No. 533, American Dyestuff Reporter.

REPRESENTATIVES

Well-established manufacturer of textile specialties for cotton, silk, wool, rayon, etc., has openings for representatives. Must have good following in the trade. The line is nationally advertised—products highest types. The company has a national reputation. Unlimited opportunity for those with ability, initiative and a good following. Confidential. Address: Classified Box No. 535, American Dyestuff Reporter.